Service.

Workshop Manual

FELICIA

1.3 ltr. Engine, Mechanical Components

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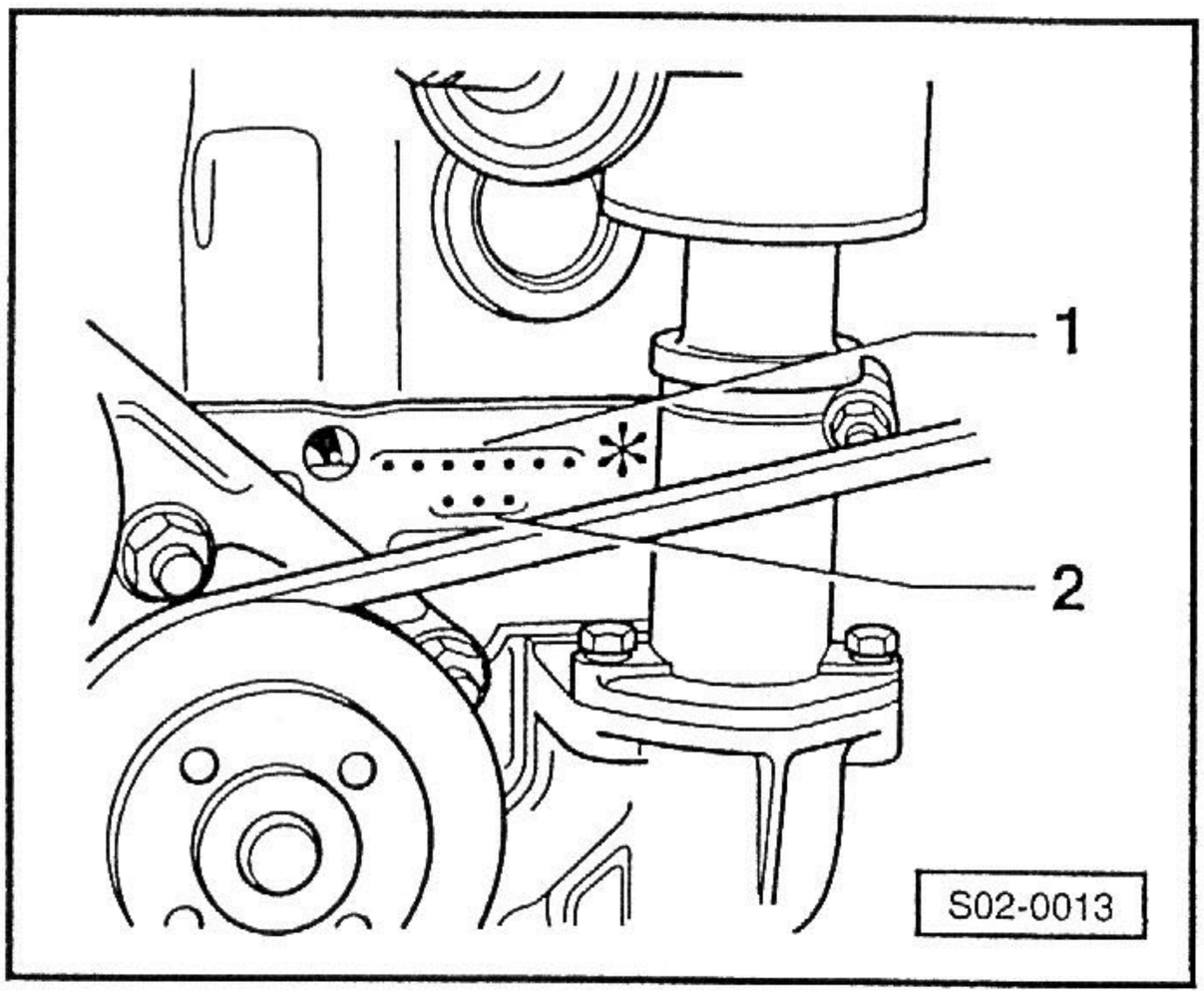


Technical data

Engine number

◀ The engine serial number -1- and the engine identification code -2- is stamped on the cylinder block behind the distributor.

The engine identification consists of two parts which are separated by a dot mark.

Example: 781 . 135 B

- ♦ 781 = Model No. (fixed)
- ♦ 135 B = 40 kW engine with Mono-Motronic

Engine features

Code letters		135	136B	136B	135M	136M
Manufactured		09.94 ➤	09.94 ➤	09.94 ➤	07.96 ➤	07.96 ➤
Displacement	l	1.3	1.3	1.3	1.3	1.3
Output	kW at rpm	42/5000 [1] 43/5000	40/5000	50/5500	40/4500	50/5000
Torque	Nm pri 1/min	94/3000	94/3250	100/3750	99/2500	106/2600
Bore	∅ mm	75.5	75.5	75.5	75.5	75.5
Stroke	mm	72	72	72	72	72
Compression ratio to 1		8.8	8.8	9.7	9.5	10
Valve timing [2]						
Inlet opens before TDC		12°	12°	22°	18°	22°
Inlet closes after BDC		48°	48°	52°	50°	52°
Exhaust opens before BDC		42°	42°	57°	54°	57°
Exhaust closes after TDC		8°	8°	17°	14°	17°
RON	min.	91 [3][4]	91 [4] unleaded	95 unleaded	91 unleaded	95 unleaded
Firing order		1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Mixture formation		Carburettor JIKOV 28-30 LEKR	Mono-Motronic	Mono-Motronic	Simos 2P	Simos 2P
Ignition		breakerless	breakerless	breakerless	breakerless	breakerless
Self-diagnosis		-	X	X	X	X
Lambda control		-	X	X	X	X
Catalytic converter		X/-	X	X	X	X

1) on models with catalytic converter

2) measured with valve clearance of 0.43 mm

3) unleaded with catalytic converter/unleaded or leaded without catalytic converter

4) should ignition pinging occur because of inadequate knock resistance of the fuel, it is recommended to refuel wi RON 95 unleaded fuel

Removing and installing engine

Removing

Special tools, testers and aids required

- Torque wrench e.g. V.A.G 1331 (5...50 Nm)
- Torque wrench e.g. V.A.G 1332 (40...200 Nm)
- Locking drift MP 3-529
- Removal and insertion device MP 8-516
- Suspension device MP 9-502/1 or MP 9-200
- Engine mount MP 9-503
- Special tool MP 1-180
- Special tool MP 9-101

Procedure

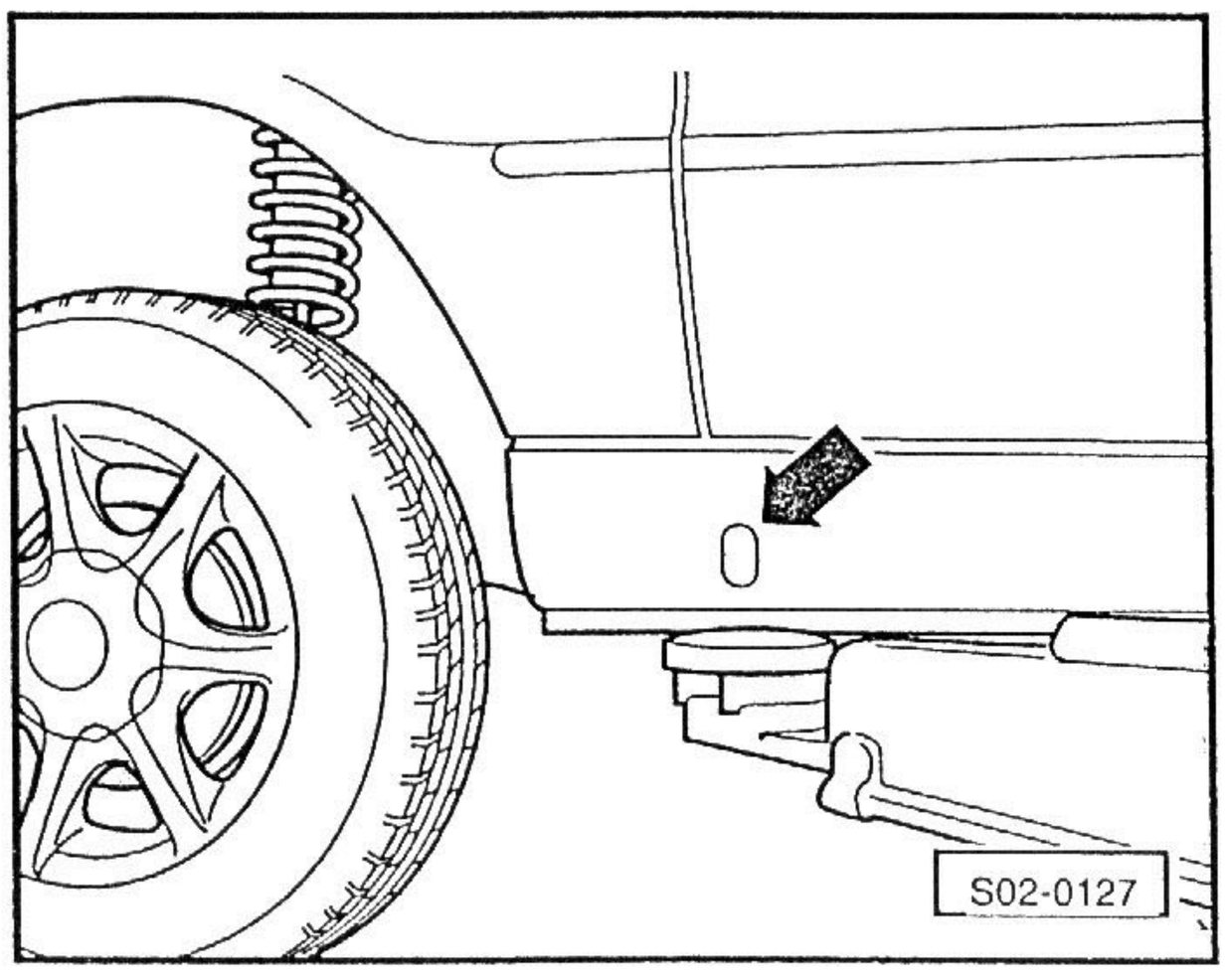
Notes:

- *The engine is removed downward together with the gearbox.*
- *If radio is fitted with anti-theft code, determine code first of all.*

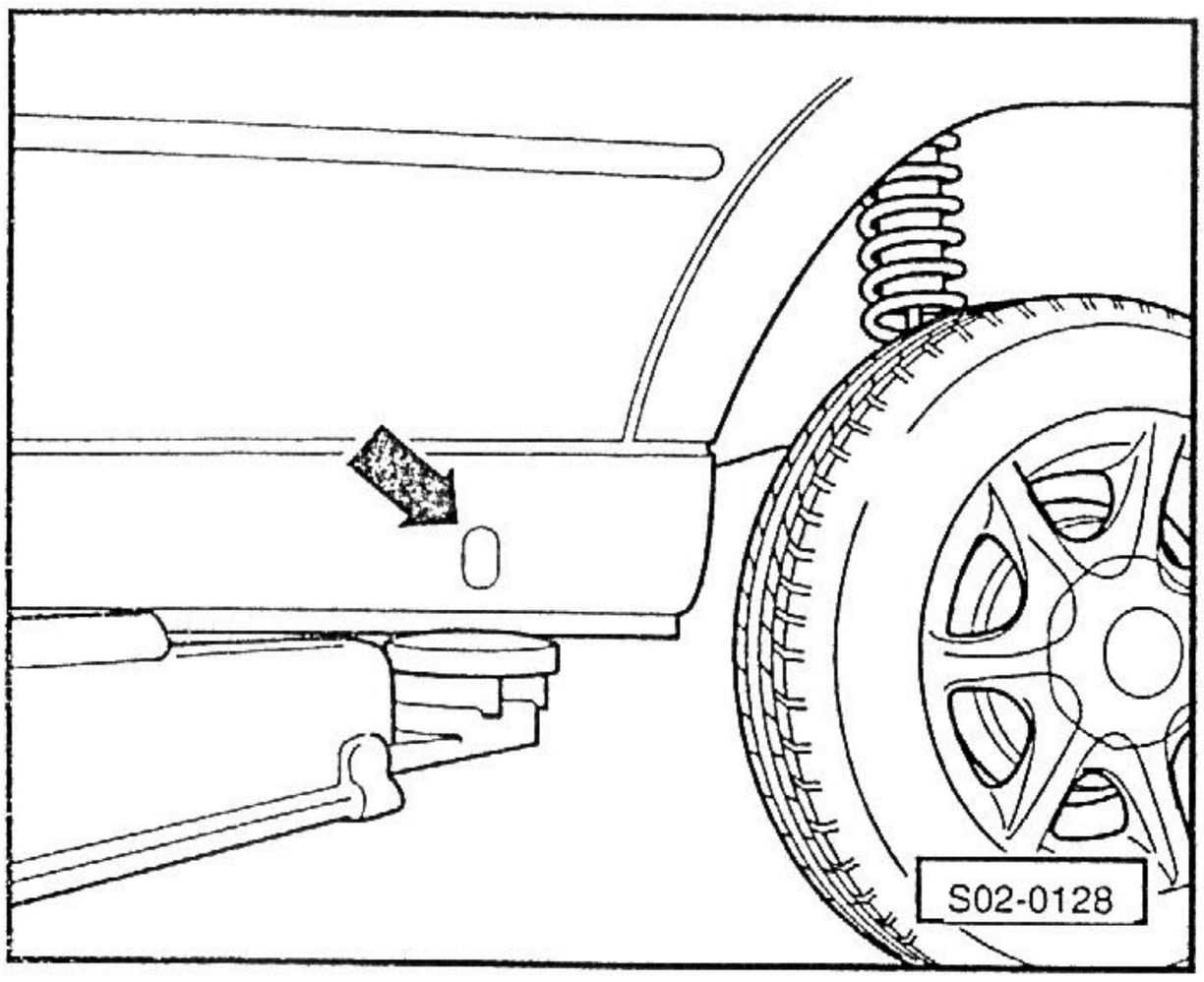
- Switch off ignition (if not already off) and disconnect earth strap at the battery.
- Slacken the wheel bolts of the front wheels.
- Raise vehicle.

Note:

The vehicle must only be raised at the jacking points shown in the illustrations in order to avoid damaging the vehicle floor or the risk of the vehicle toppling



◄ Front jacking point.



◄ Rear jacking point.

- The middle of the jacking point and the middle of the oval indentation in the lower sill should be aligned (see illustrations).

- Take off front wheels.

- Remove engine compartment cover and cover for V-belt/ribbed V-belt.

- Unbolt front exhaust pipe at exhaust manifold. On models fitted with fuel injection system, unplug the connector of the lambda probe.

- Drain coolant ⇒ page 19-8.

- Drain gear oil:
  ⇒ 5-speed manual gearbox; repair group 34; Inspecting and changing gear oil

- Disconnect clutch cable:
  ⇒ 5-speed manual gearbox; repair group 30; Servicing clutch mechanism; Removing and installing clutch cable

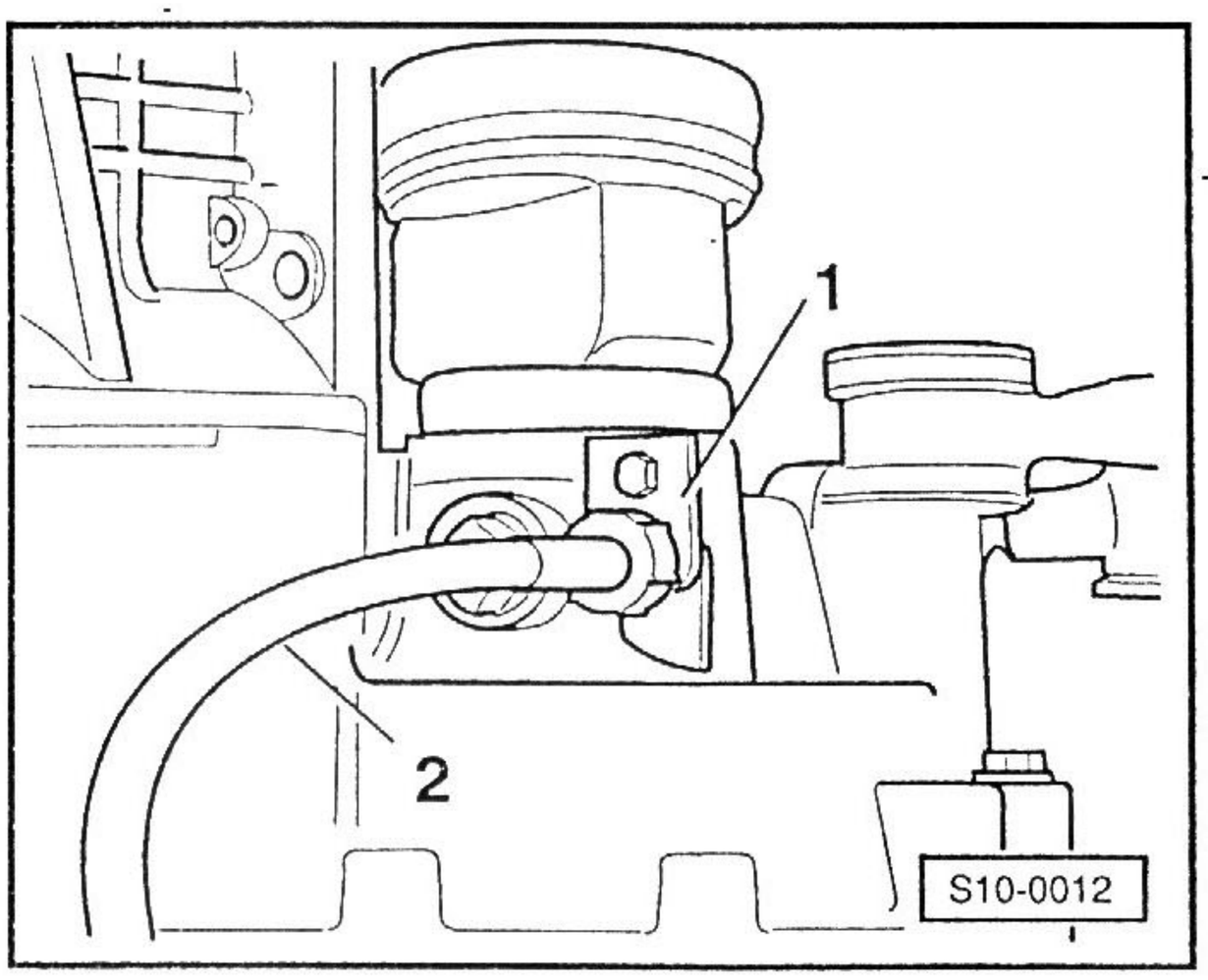
- Remove supporting bracket of clutch cable together with holder for earth cables (models with fuel injection system).

- Remove air filter.

- Slacken bolts securing the alternator and push alternator towards cylinder head as far as the stop.

- Unbolt cables at the starter and alternator.

- Unplug connector for reversing lights.



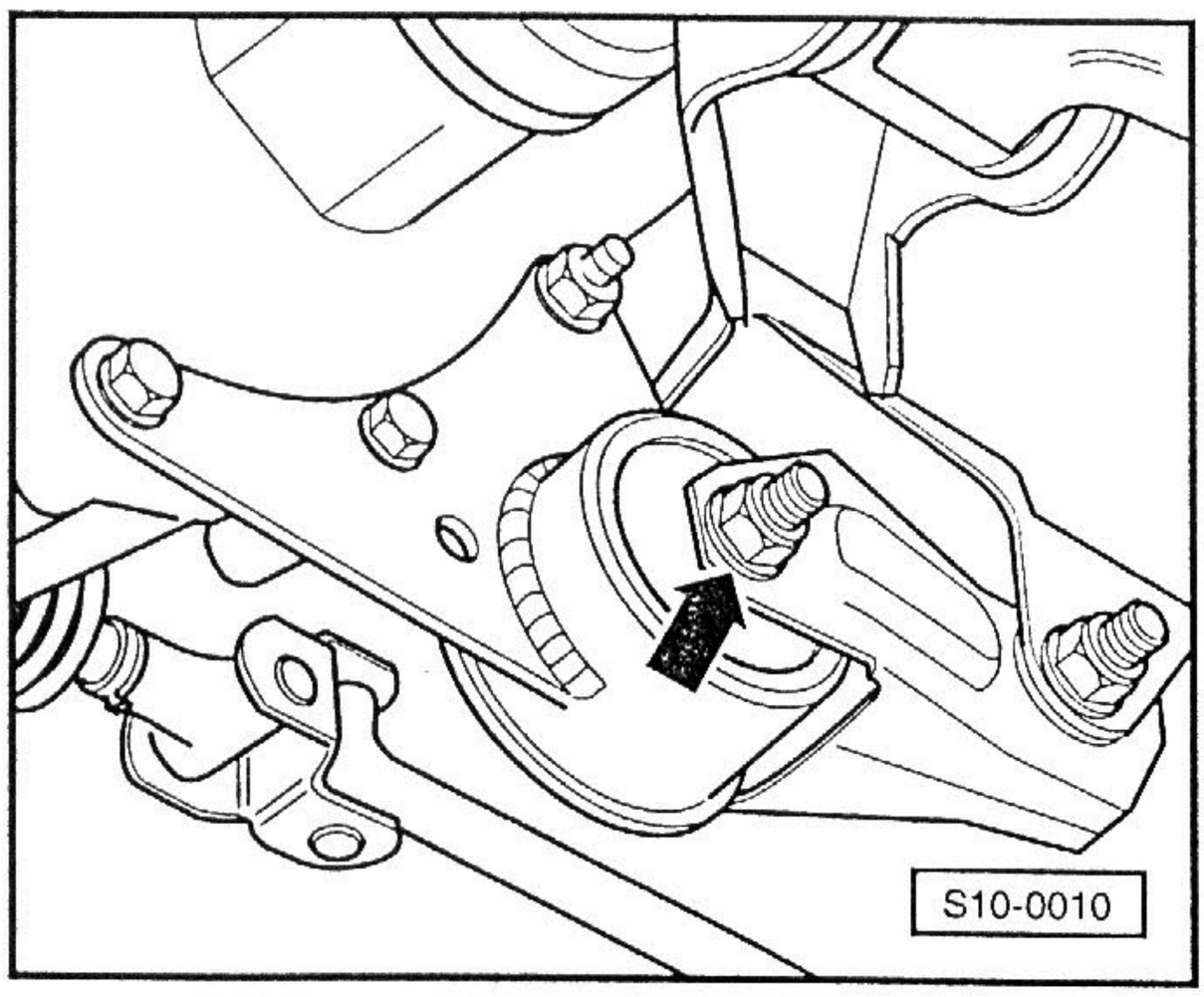
◄ - Unbolt retaining bracket -1- and pull out drive shaft for speedometer -2-.

- Unplug connector of the engine speed sensor (models with fuel injection system).

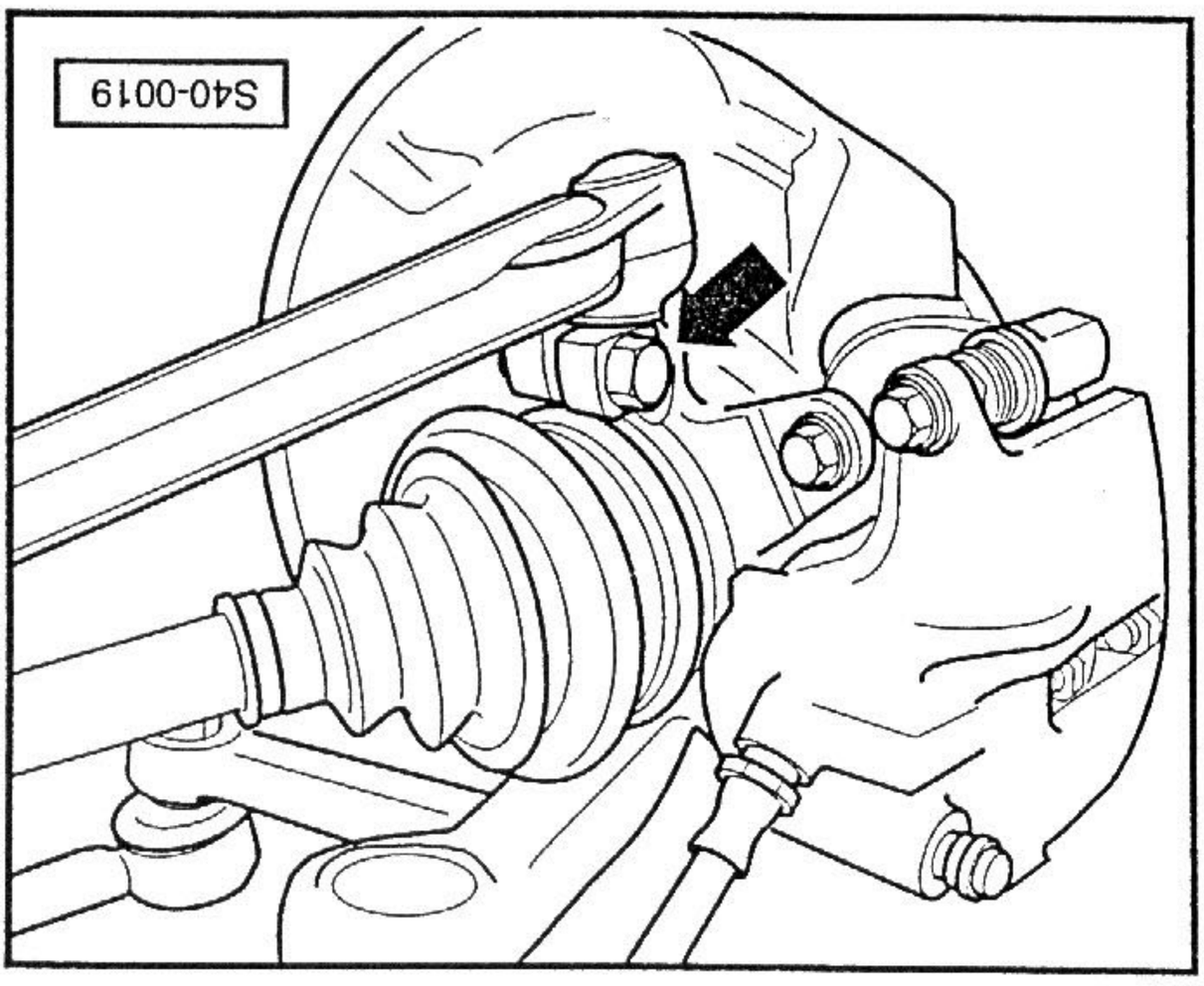
- Unbolt earth cable (close to coolant pump) from the cylinder block.

- Unbolt shift support at gearbox.

- Use removal and insertion tool MP 8-516 to remove pin of the shift rod and pull shift rod off the gearbox.



◄- Remove the bolt from the pendulum support.



◄- Unscrew clamping bolt -arrow- and pull the steering joint of the left and right steering arm off the wheel bearing housing.

Note:

When removing, ensure that the joint boots are not damaged.

- Press both drive shafts about 20 mm out of the gearbox.

- Pull one drive shaft fully out of the gearbox and secure differential with locking drift MP 3-529.

- Pull out second drive shaft and tie up both drive shafts.

- Disconnect throttle cable at the injection unit or carburettor, respectively.

- Disconnect coolant hoses to radiator, heat exchanger and also expansion reservoir.

- Disconnect vacuum pipes to the brake servo unit and activated charcoal filter (if fitted).

- Disconnect fuel feed and fuel return pipes.

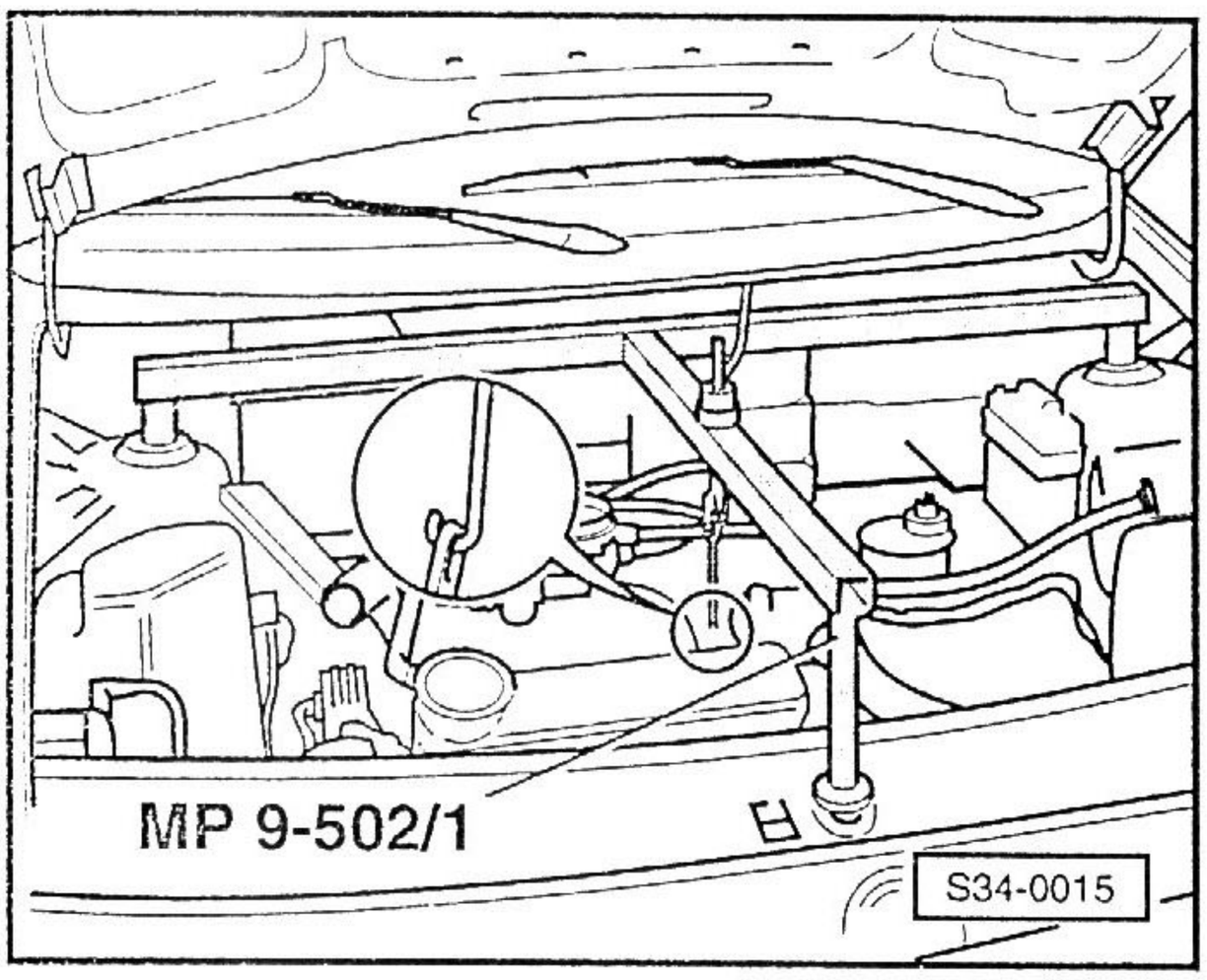
Important!

Fuel system is pressurised! Place cleaning rags around the connection point before detaching the hose connections. Then, release the pressure by carefully disconnecting the hose.

- Disconnect ignition cable to the ignition transformer or to the ignition coil at the distributor, respectively.

- Unplug connector from the coolant temperature gauge sender and oil pressure switch.

-



- Unplug relevant connectors from the injection unit, injector and coolant temperature gauge (models with fuel injection system) ⇒ Mono-Motronic or Simos 2P fuel injection and ignition system; repair group 24; List of fitting locations

◀ - Attach suspension device MP 9-502/1 and take up load of engine.

Note:

Suspension device MP 9-502/1 can be used in place of the special tool MP 9-200.

Only on models with air conditioning

Notes:

- *Do not open refrigerant circuit; refrigerant pipes remain attached to the compressor.*
- *Alternator must not be slackened or removed.*

- Disconnect vacuum hose for vacuum reservoir at fuel injection unit/carburettor.

- Unplug connector for magnetic coupling at the compressor.

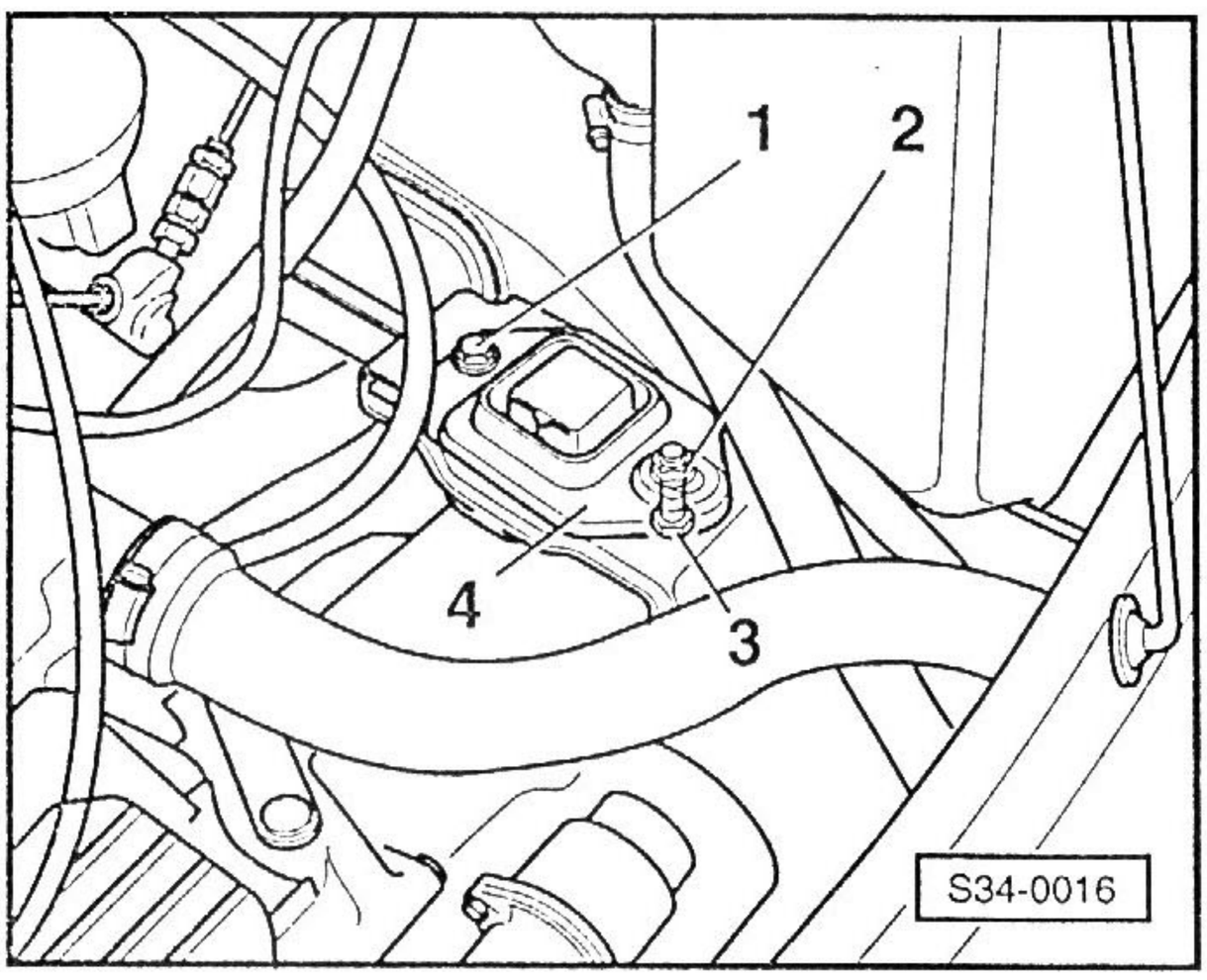
- Unbolt compressor from the bracket ⇒ Heating, air conditioning; repair group 87; Servicing air conditioning and heating - engine compartment; Removing and installing compressor.

- Use a hook (shop-made tool) to suspend compressor at the securing plates below the radiator at the body.

Note:

Do not kink refrigerant pipes or hoses; they should be as free of stress as possible.

Continuation for all models

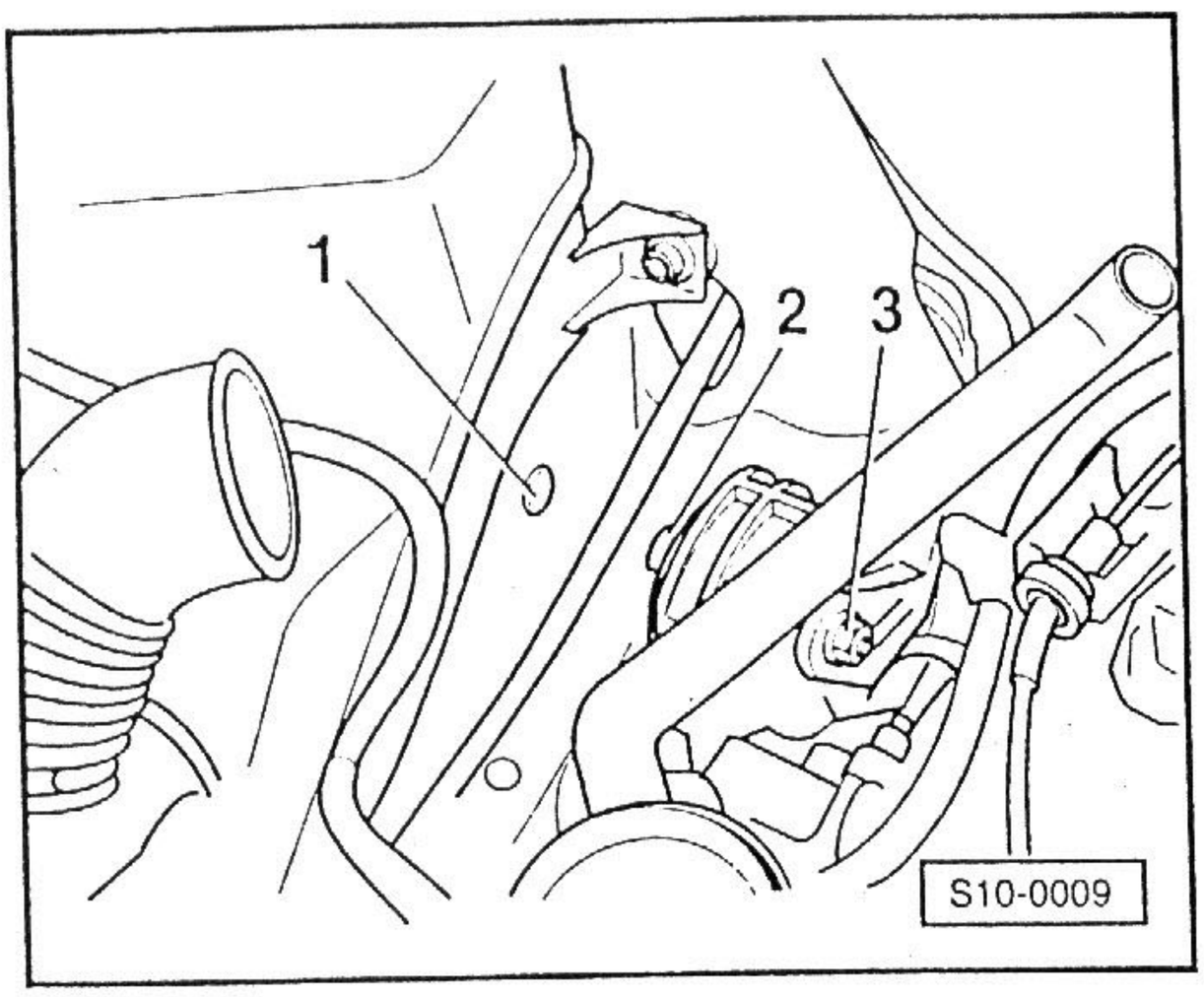


◀ - Mark installation position of gearbox mount from below.

- Unscrew self-locking nut -2- from bolt -3- and take out bolts -1- and -3-.

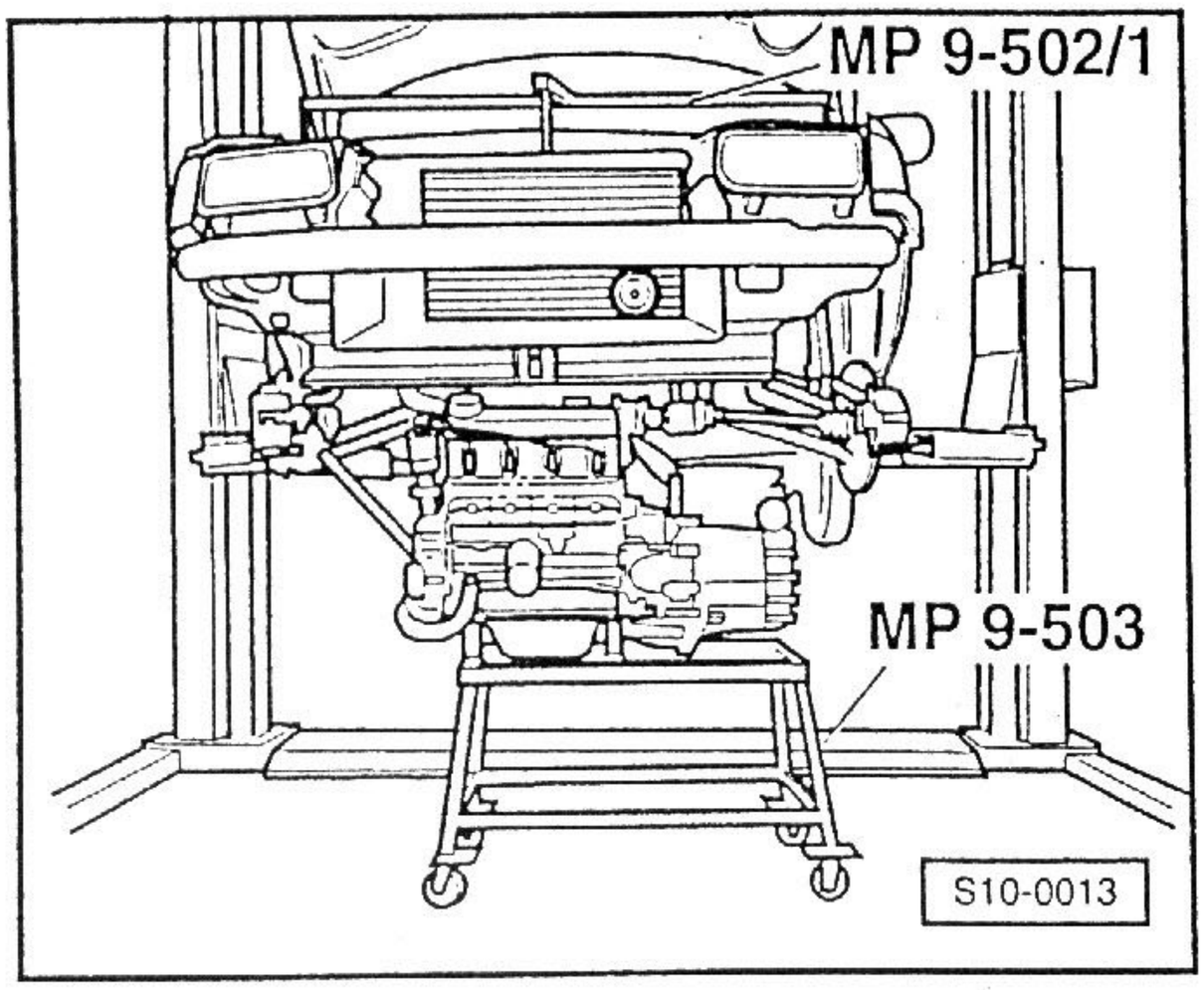
- Take off cover -4-.

- Position engine mount MP 9-503 below the engine and lower vehicle sufficiently until the engine is suspended directly above the engine mount.



◄ - Lever out plug -1- from the wheelhouse side.

- Unscrew hexagon nut -3- and remove hexagon bolt -2-.

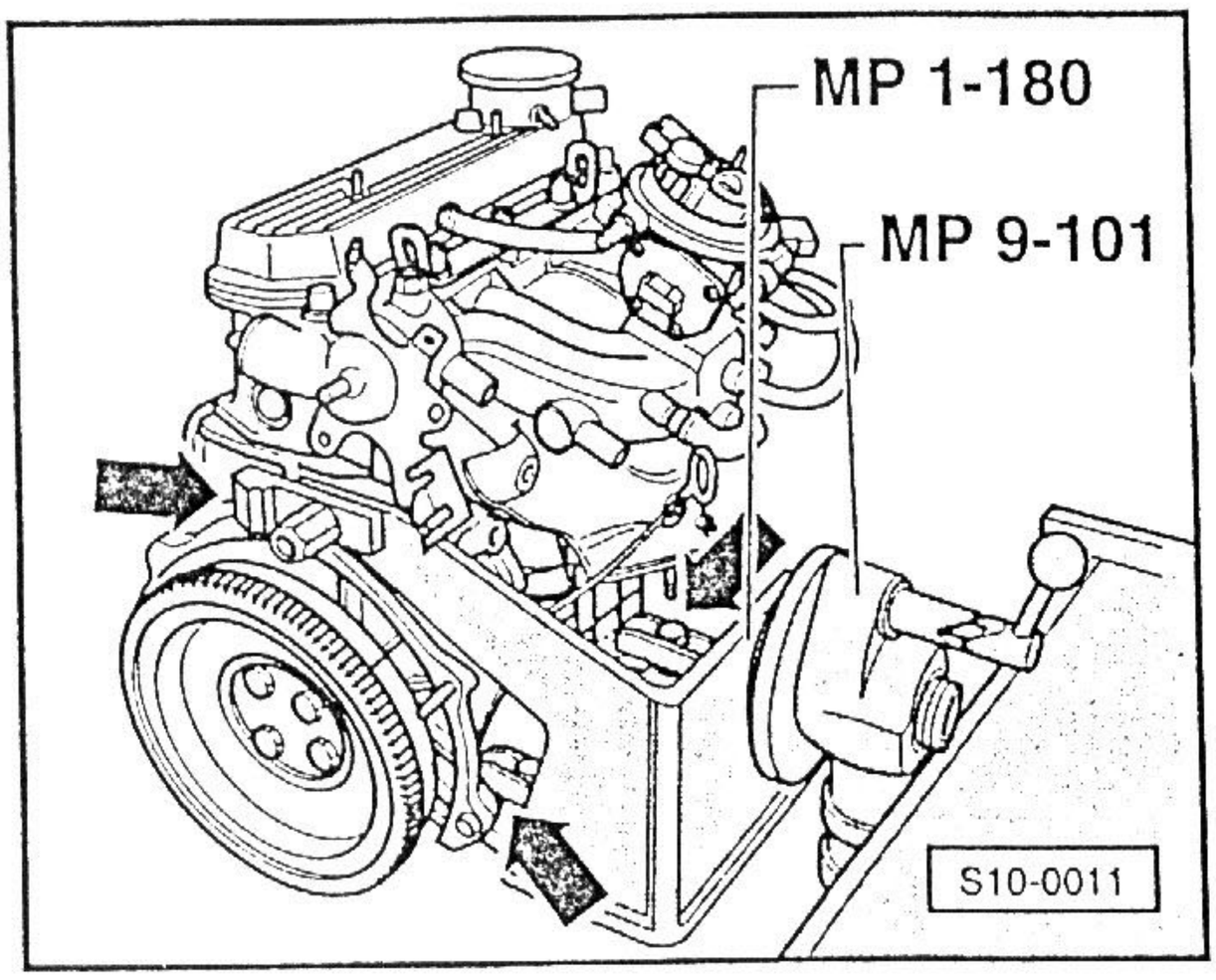


◄ - Lower engine with lifting device MP 9-502/1 onto engine support MP 9-503.

- Detach lifting device and raise car.

Note:

When raising the car, ensure that the engine does not touch the body in order to avoid any possible damage.



◄ The engine should be attached with the engine holder MP 1-180 to the repair stand MP 9-101 for performing removal and installation work.

Note:

Tension the engine at the mounts of the engine holder -arrow-.

Installing

Installation is performed in the reverse order; pay attention to the following points:

- Examine clutch release bearing for signs of wear; replace if necessary.

-

- Check whether the dowel sleeves for centering engine/gearbox in the cylinder block are fitted; insert, if necessary.

- Replace self-locking nuts.

- Pay attention to marking when installing the gearbox holder.

- Insert new plug, if necessary.

- Install and tension V-belt/ribbed V-belt
⇒ Electrical System; Repair Group 27; Removing and installing ribbed V-belt (also models with air conditioning)
⇒ Inspection and Maintenance; Checking ribbed V-belt condition and tension; tensioning, if necessary.

- Top up coolant ⇒ page 19-8

- Adjust throttle cable ⇒ page 20-12

- Secure fuel feed and fuel return pipes with spring steel clips.

- Install pin of shift rod
⇒ 5-Speed Manual Gearbox; Repair Group 34; Removing and installing gearbox

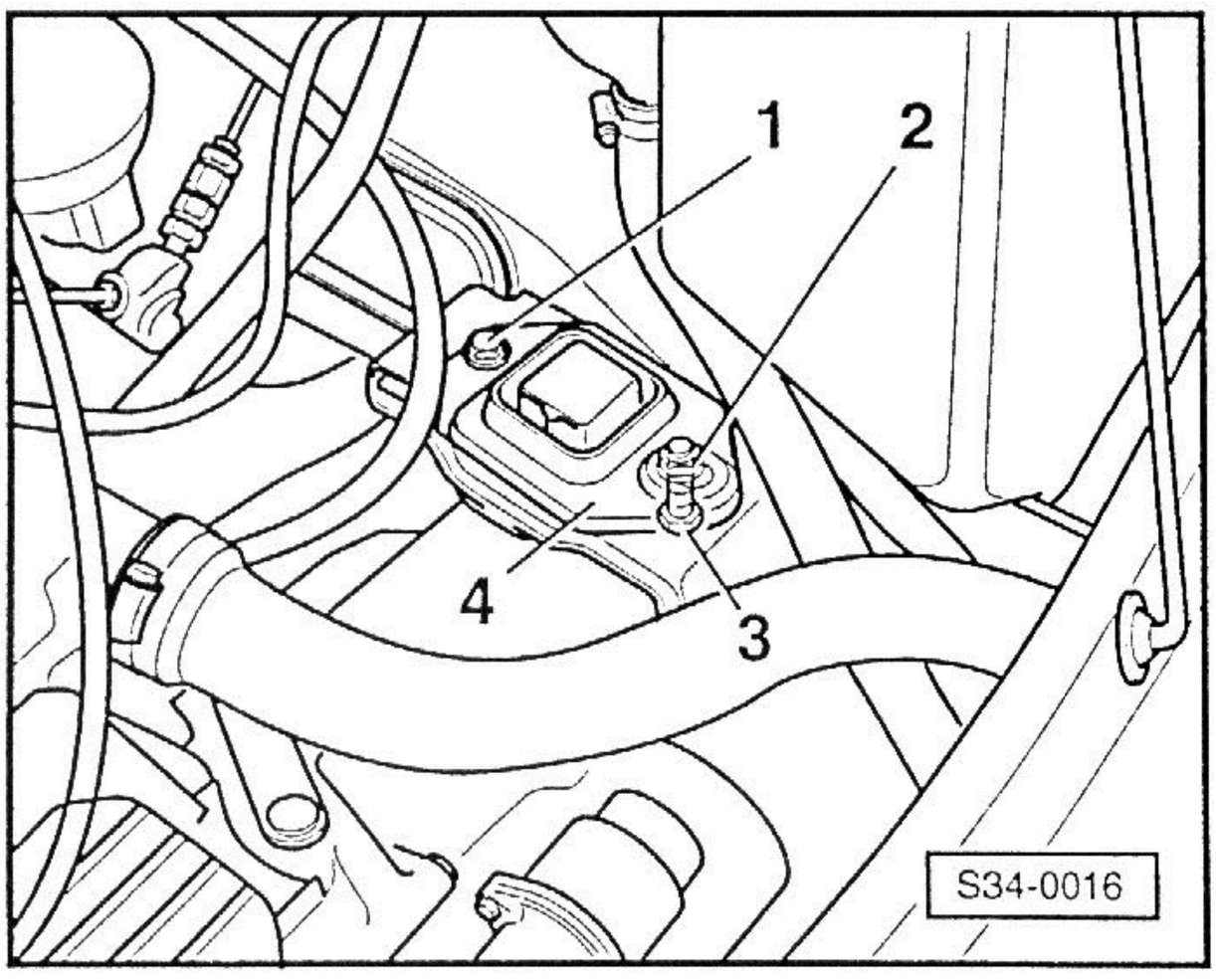
- Top up gear oil
⇒ 5-Speed Manual Gearbox; Repair Group 34; Inspecting and changing gear oil

- Install clutch cable
⇒ 5-Speed Manual Gearbox; Repair Group 30; Servicing clutch mechanism; Removing and installing clutch cable

-

Tightening torques

Bolted connection	Tightening torque
Engine to gearbox	45 Nm
Exhaust pipe to manifold	20 Nm
Engine support	50 Nm
Pendulum support	55 Nm
Clamping bolt of steering joint	65 Nm
Wheel bolts	110 Nm

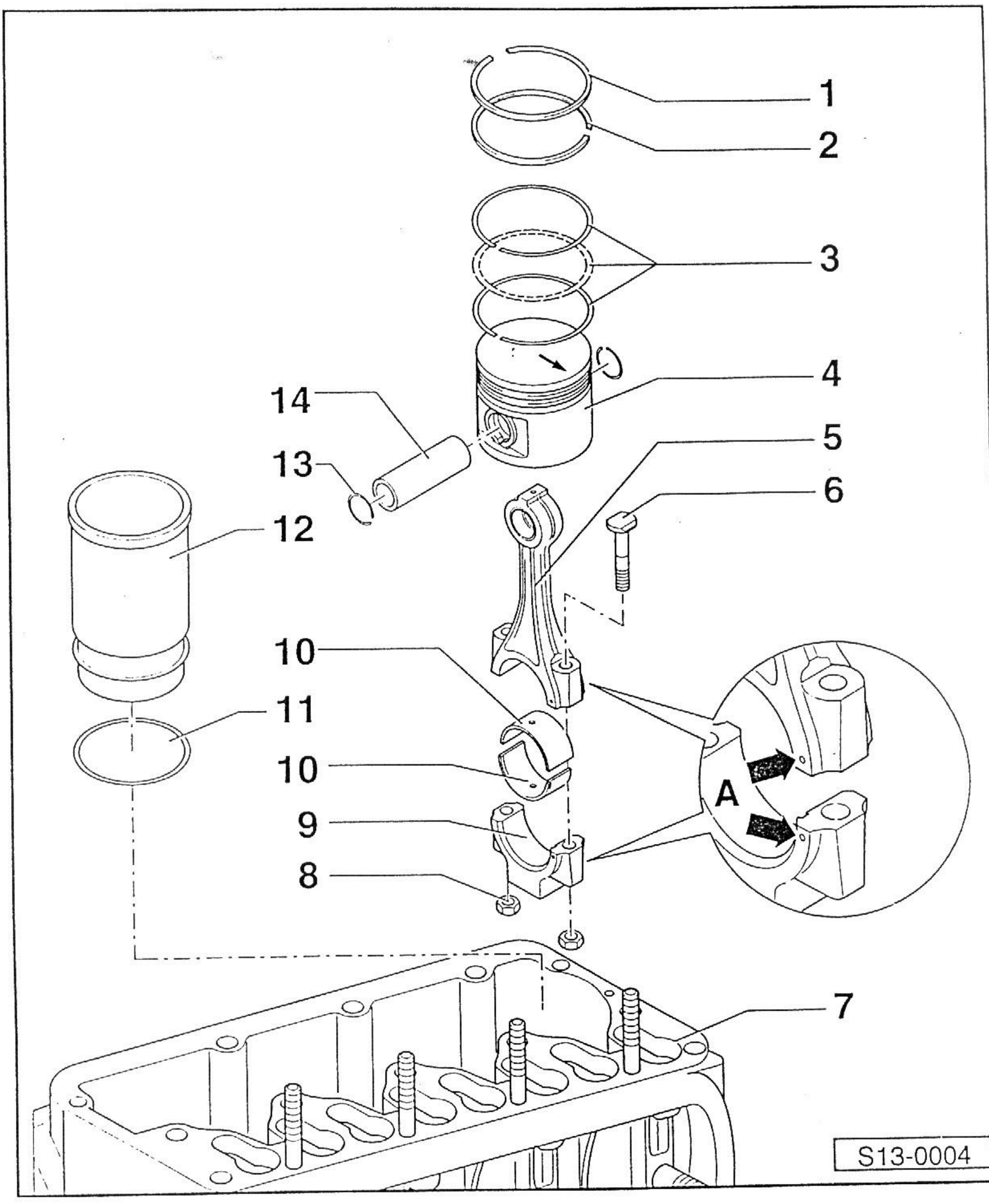


◀ – Tighten bolt -1- of the gearbox mount to 55 Nm.

– Tighten bolt -3- of the gearbox mount to 60 Nm.

– Tighten new self-locking nut -2- on the front bolt -3- to 55 Nm.

Dismantling and assembling pistons, conrod and liner

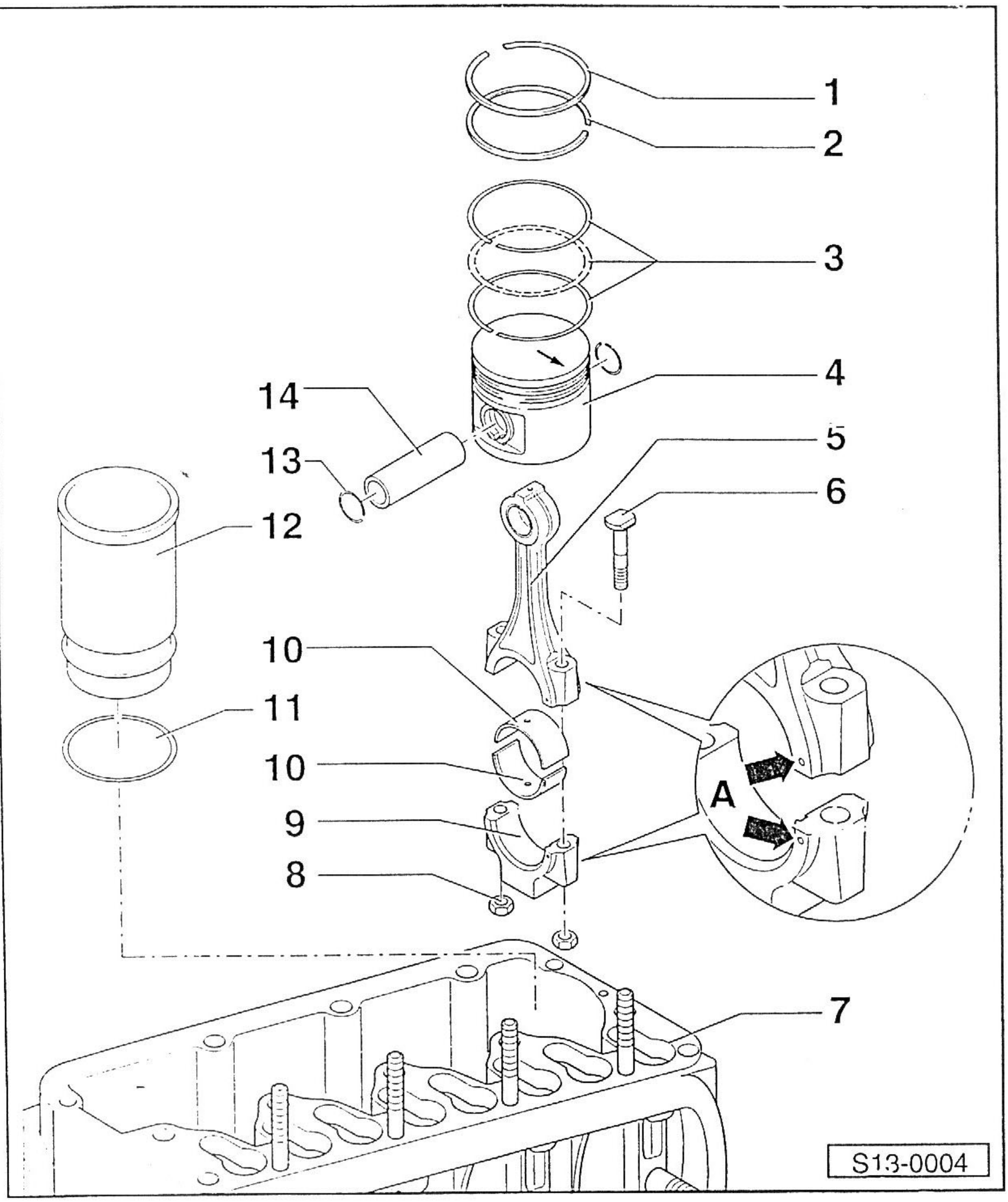


Notes:

- *If fairly large quantities of metal swarf and abrasion -caused by fretting damage such as crankshaft and conrod bearing damage- are found in the engine oil when performing repairs to the engine, carefully clean oil passages in order to avoid consequential damage.*
- *If the engine is not completely dismantled, secure the crankshaft to prevent it being displaced axially ⇒ Fig. 1.*

Special tools, testers and aids required

- Axial bearing supporting bush MP1-112
- Liner ejector MP1-105/1
- Piston pin drift MP1-104

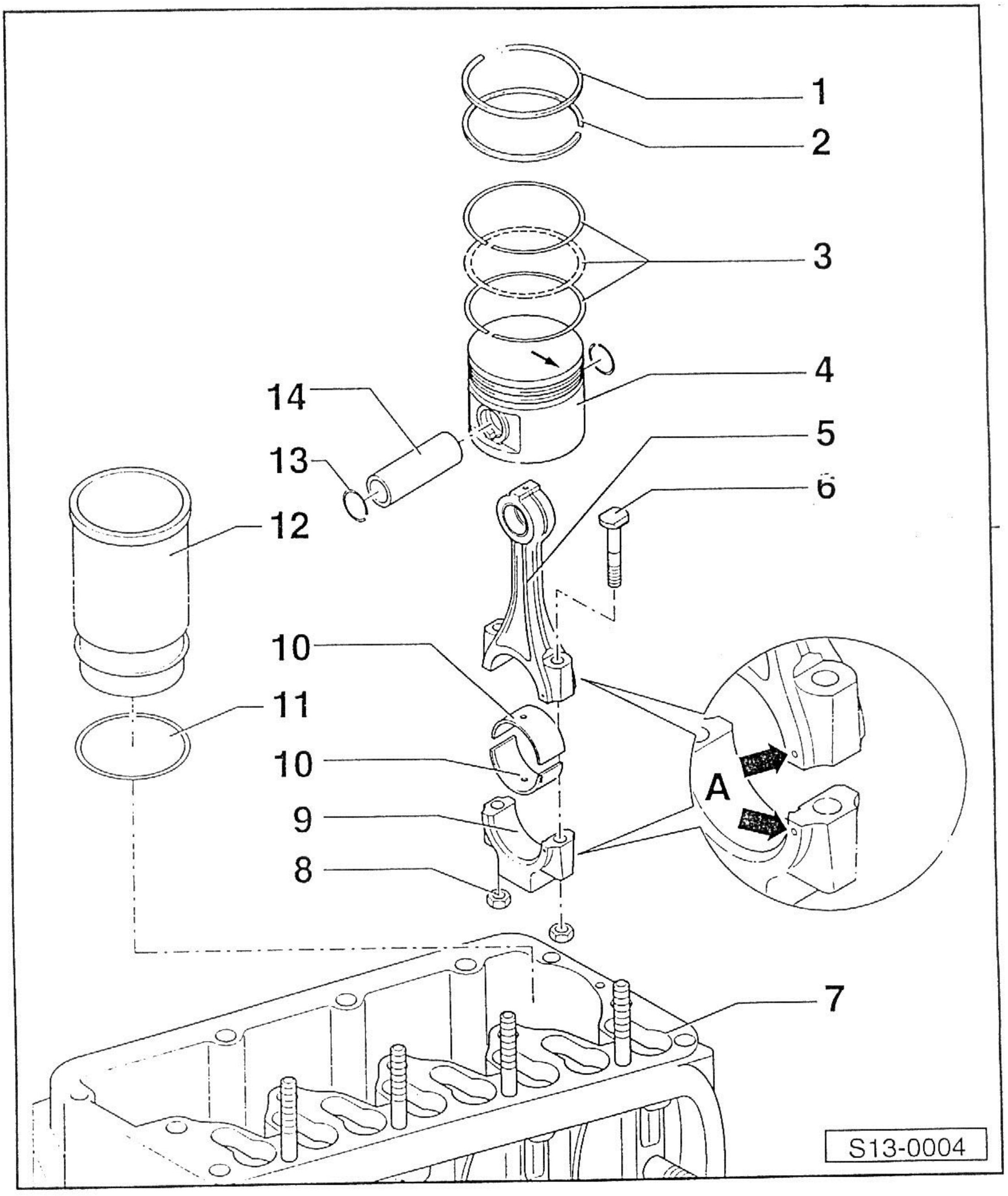


1 - Piston ring (chrome-plated)
- Moves freely in piston grooves
- Marking „TOP" faces piston crown
- Checking gap clearance ⇒ Fig. 2

2 - Piston ring (chamfered)
- Moves freely in piston grooves
- Marking „TOP" faces piston crown
- Checking gap clearance ⇒ Fig. 2
- Offset gap 120° relative to top piston ring

3 - Oil scraper ring (3-section)
- Moves freely in piston grooves
- Installing ⇒ Fig. 3

4 - Piston
- Examining ⇒ Figs. 4 and 5
- Mark fitting location and matching liner
- Arrow on piston crown faces camshaft end
- Attaching ⇒ page 13-7



5 - **Conrod**
- Fitting location:
  Numbers -arrow A- face timing gear end
- Examining ⇒ page 13-8

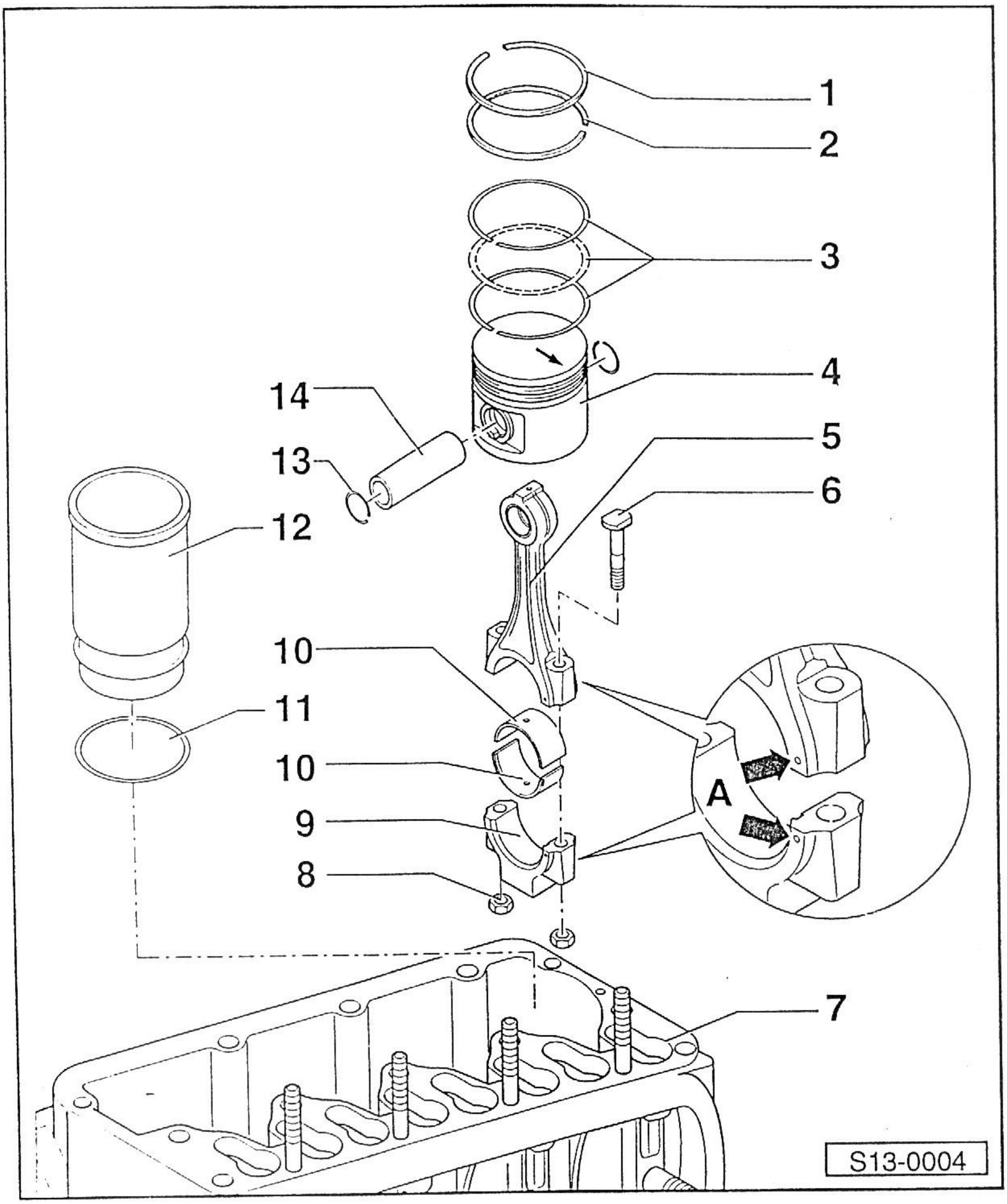
6 - **Conrod bolt**
- Pay attention to fitting location
- Press out for replacing

7 - **Cylinder block**
- Examine seat surface of liner, rework ⇒ page 13-10

8 - **Hexagon nut**
- Oil thread and contact surface
- 40 Nm

9 - **Conrod cap**
- Pay attention to fitting location

10 - **Bearing shell**
- Pay attention to fitting location
- Ensure seated tightly in retaining lugs
- Dimension of bearing shell matched to nominal size of crankshaft ⇒ page 13-10



11 - Shim
- Replace

12 - Liner
- Check protrusion ⇒ page 13-11
- Replace only with matching pistons (tolerance groups A, B, C)
- Use MP1-105/1 for removing

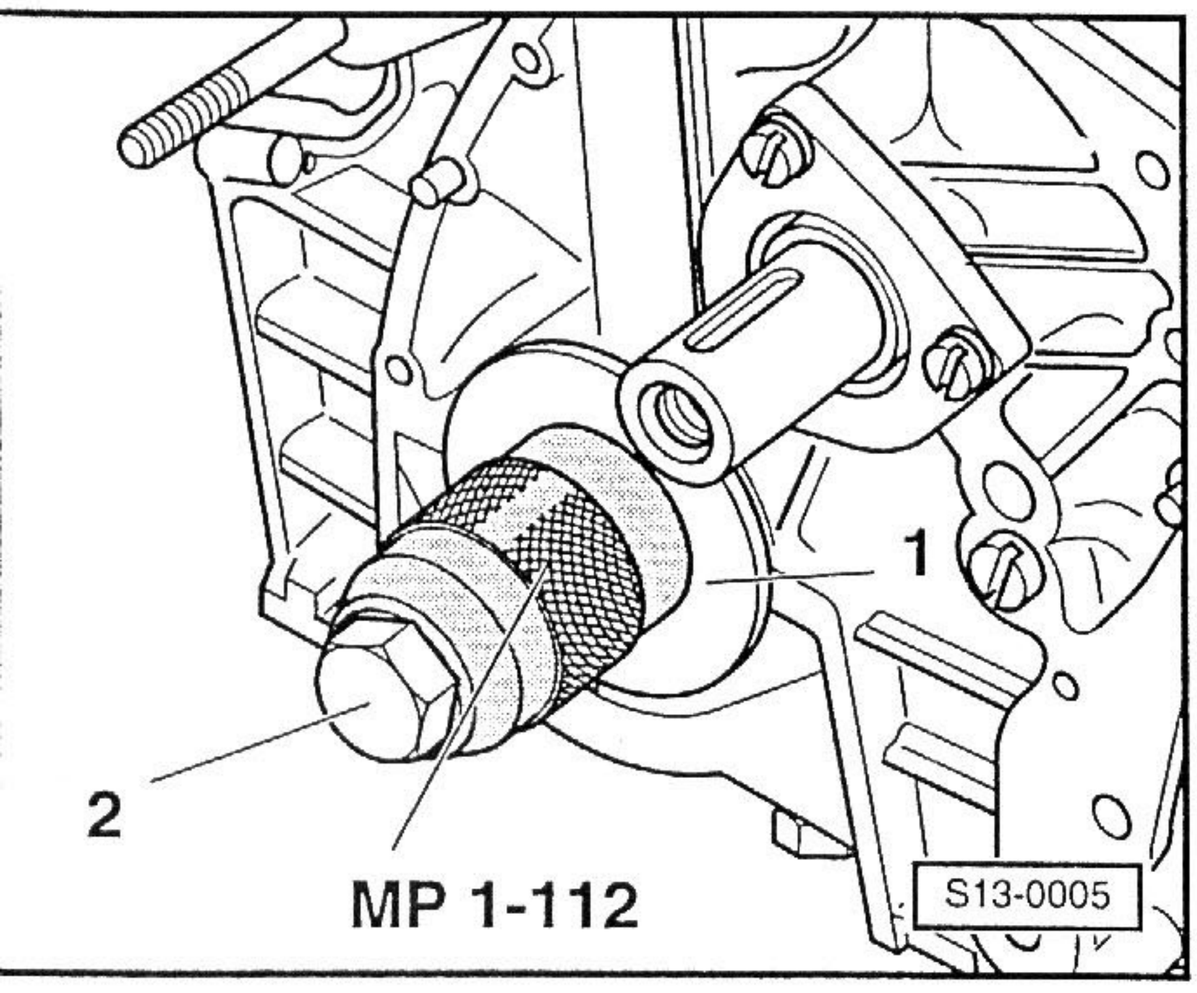
13 - Circlip
- Installing ⇒ page 13-8

14 - Piston pin
- Use MP1-104 for removing
- Installing ⇒ page 13-7
- Play when installed ⇒ Fig. 5

Piston and cylinder dimensions

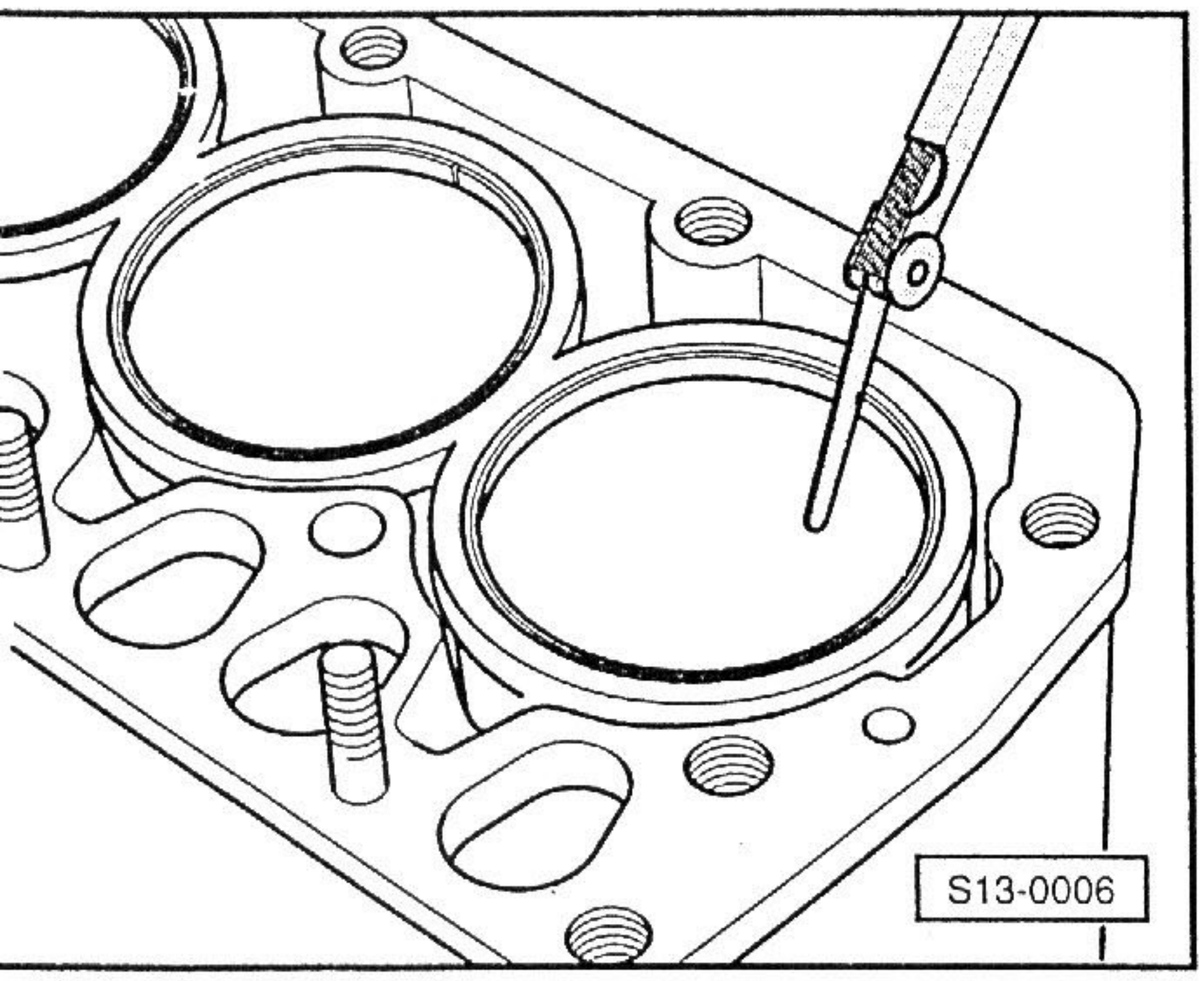
Special tools, testers and aids required

- Axial bearing supporting bush MP 1-112
- Feeler gauge
- Internal precision measuring instrument 50...100 mm



◄ **Fig. 1 Securing crankshaft to prevent it being displaced axially**

- Fit guide ring and supporting ring -1- over the crankshaft.
- Fit on axial bearing supporting bush MP 1-112.
- Screw in hexagon bolt -2- and tighten.

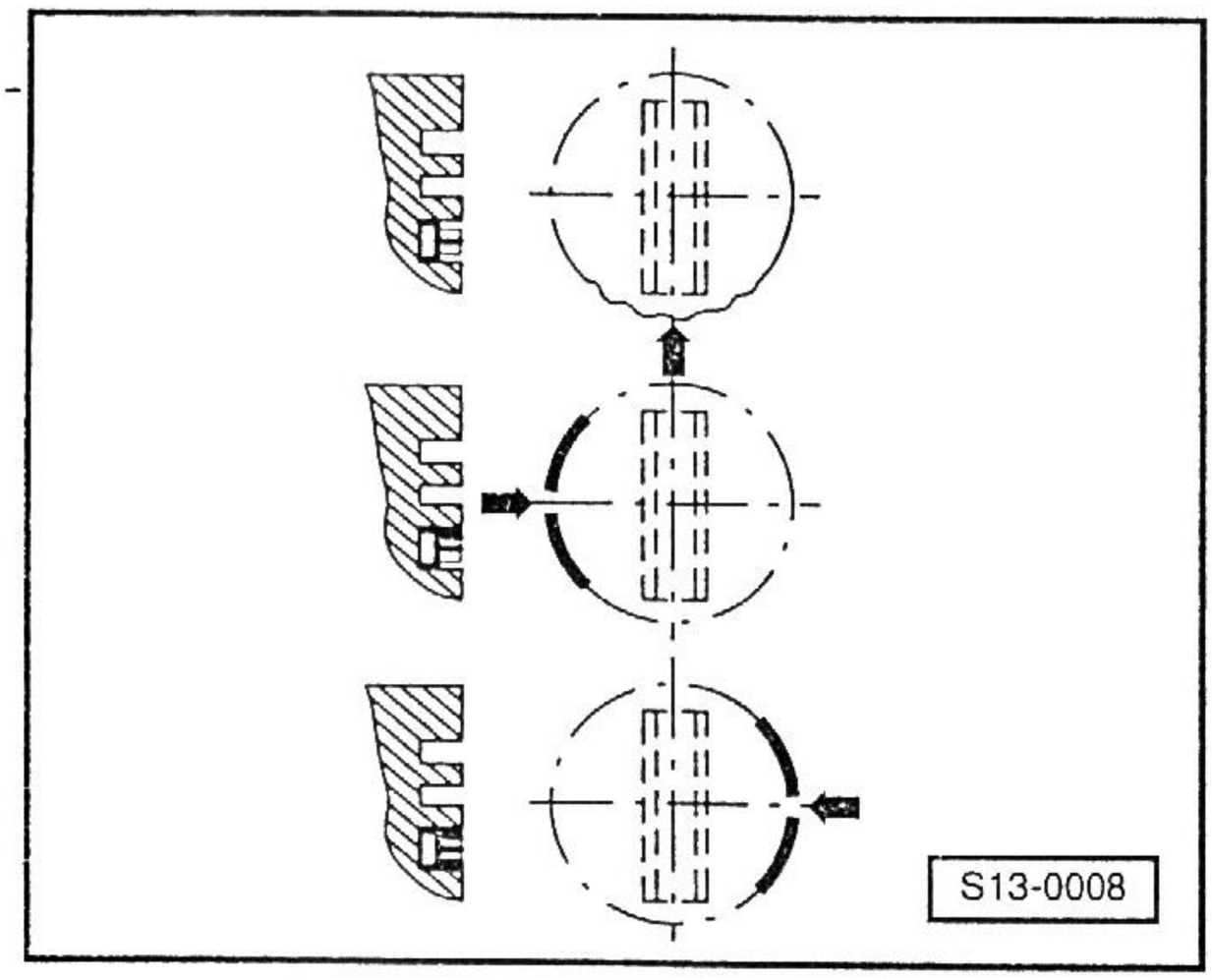


◄ **Fig. 2 Checking gap clearance of piston ring**

- Push in piston ring from above about 15 mm away from edge of liner.

Gap clearance of chrome-plated piston ring:
0.040...0.072 mm

Gap clearance of chamfered piston ring:
0.030...0.062 mm



◄ Fig. 3 Sequence and installation of oil scraper ring

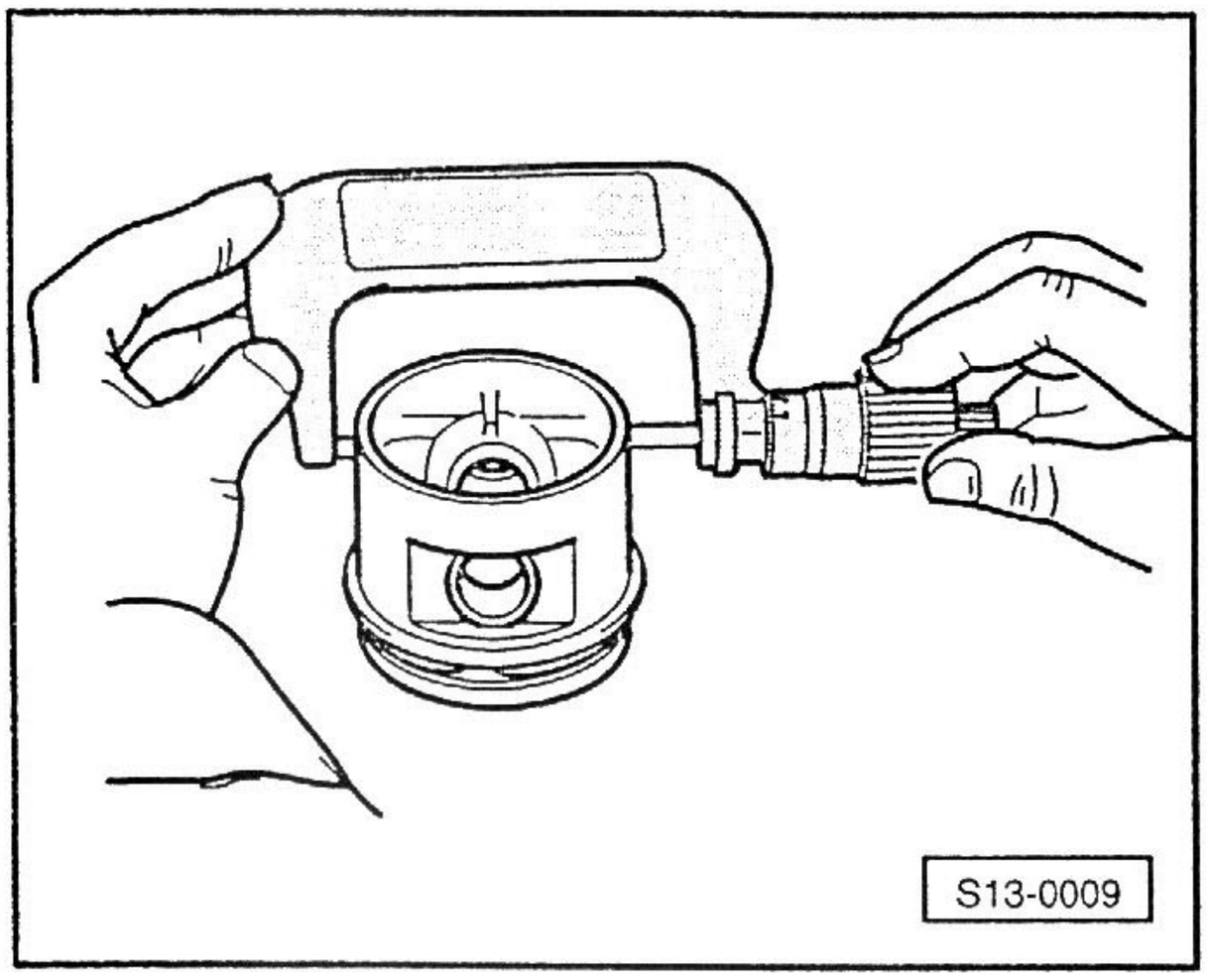
The oil scraper ring consists of a spring ring, a top and bottom steel lamellar ring.

It is installed in the following stages:

- Insert spring ring into groove, position the joint so that there is no hole position behind it.

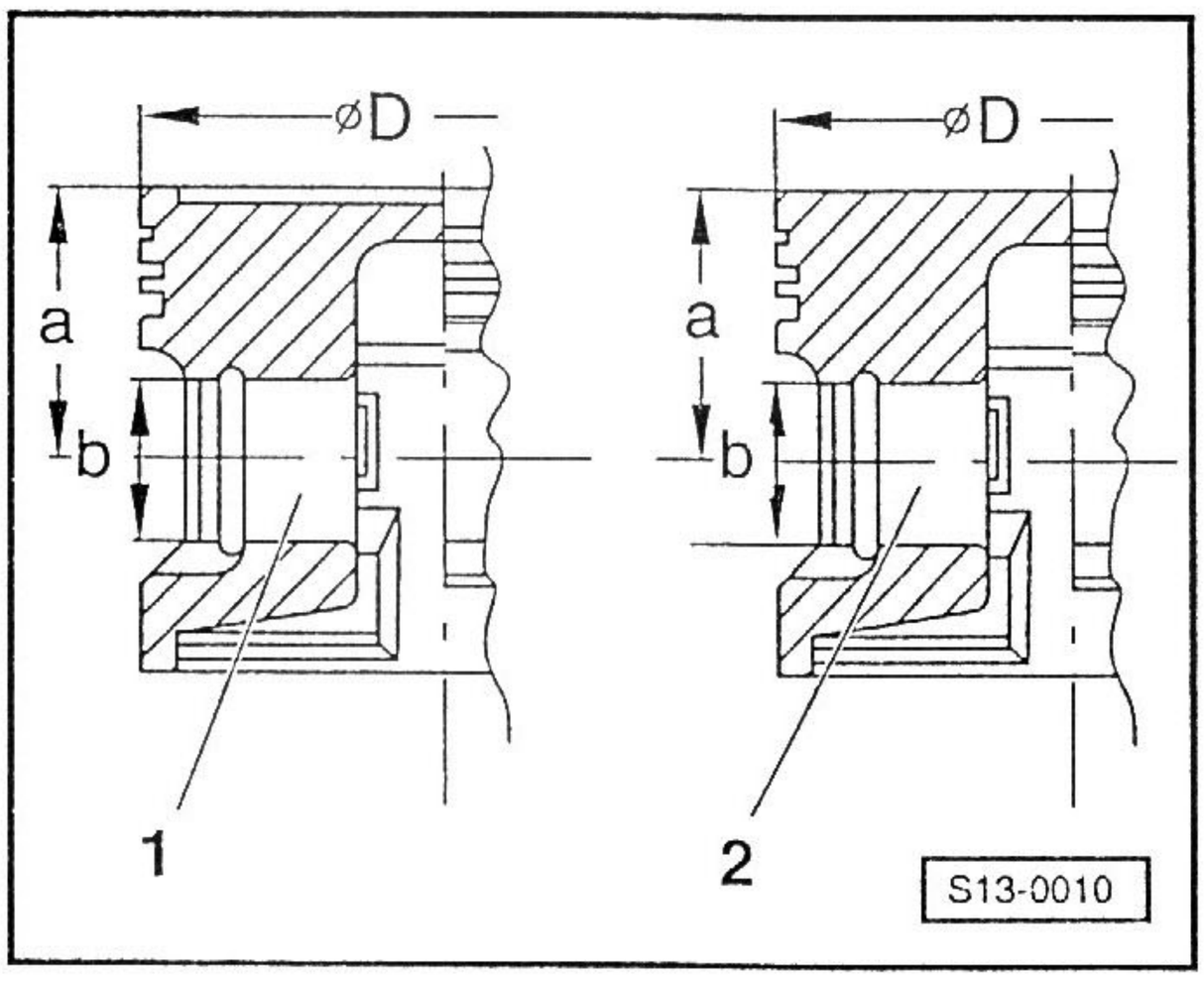
- Compress spring ring joint and insert top steel metal ring. The start should be positioned 45° to 90° to the left of the joint of the spring ring be inserted facing the joint.

- Carry out the same procedure when inserting the bottom steel metal ring. The start should be 45° to 90° to the right of the joint of the spring ring and be inserted facing the joint.



◄ Fig. 4 Inspecting pistons

- Measure about 10 mm from bottom edge offset 90° to piston pin axis.



◄ Fig. 5 Piston dimensions

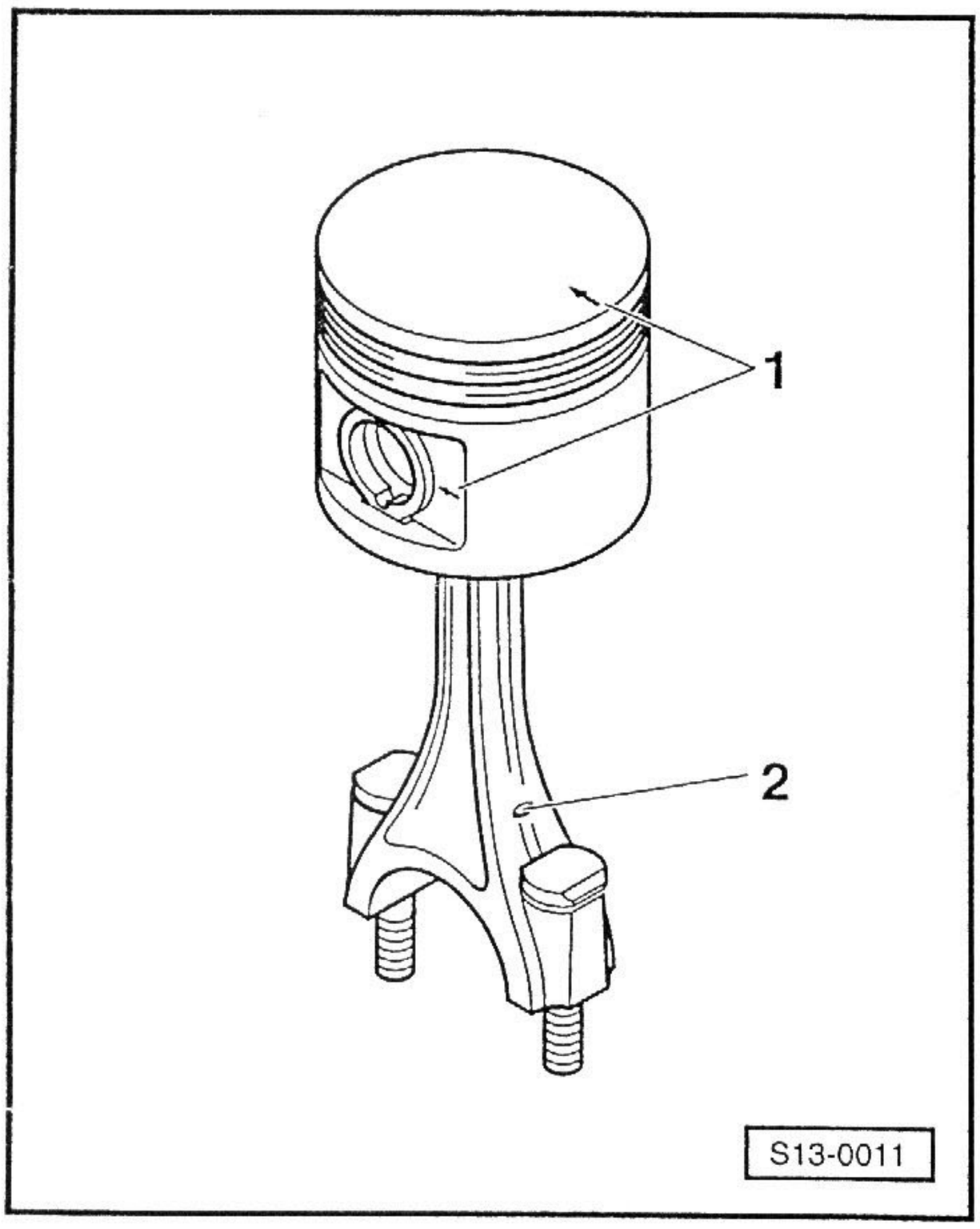
Item -1- piston version for engine type 135, 135B, 135M
Item -2- piston version for engine type 136B, 136M

Code letters	Dimension -a- in mm	Tolerance in mm	∅ -b- in mm	Tolerance in mm
135,135B 135M 1) 136B	34.35	± 0.05	20	+ 0.007 - 0.002
136M	34.65	± 0.05		

1) Piston version for engine type 135M has a narrower chamber depth.

Code letters	Dimension -a- in mm	Tolerance in mm	∅ -b- in mm	Tolerance in mm
135,135B 135M [1] 136B	34.35	± 0.05	20	+ 0.007 - 0.002
136M	34.65	± 0.05		

[1] Piston version for engine type 135M has a narrower chamber depth.



Tolerance and matching piston	∅ -D- in mm	Tolerance in mm
A	75.475	± 0.009
B	75.485	
C	75.495	

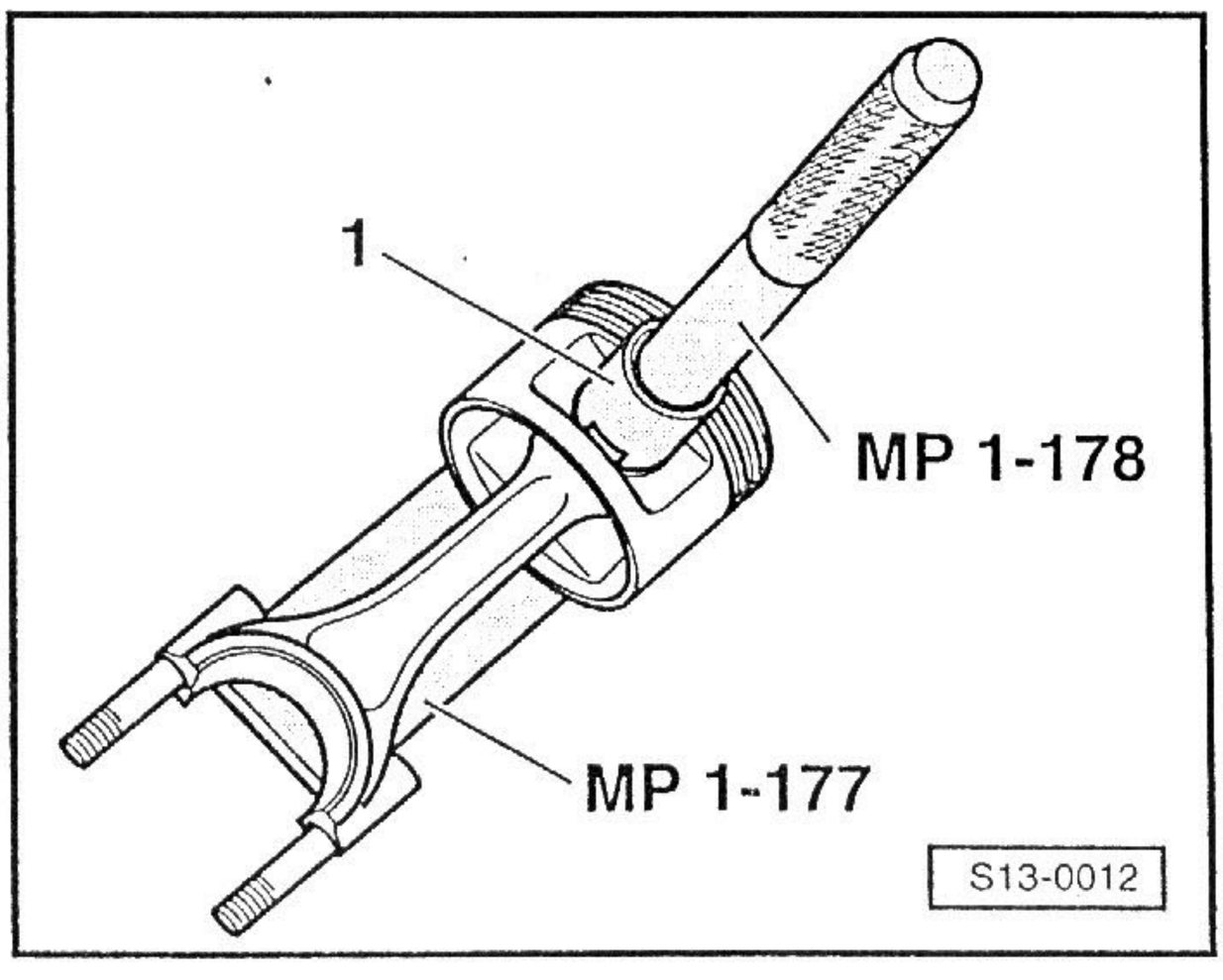
Piston pin ∅ in mm	Bore ∅ in conrod bush
20 + 0.000 - 0.003	20 + 0.005 - 0.001

Attaching piston to conrod

Special tools, testers and aids required

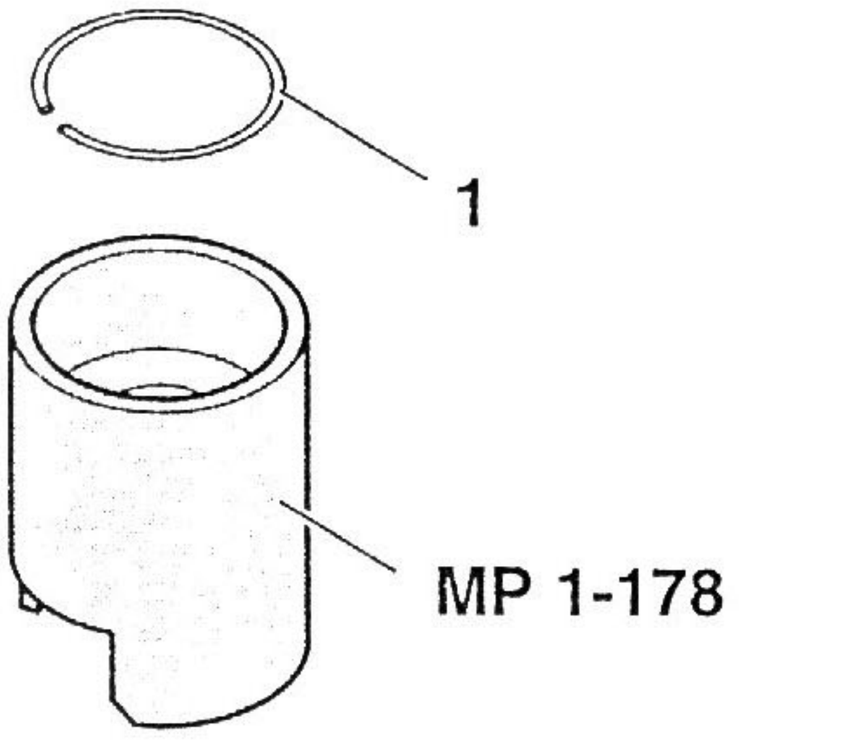
- Assembly device for circlip MP 1-117
- Piston pin drift MP 1-178

◀ - Position piston on conrod so that the two arrows on the piston crown and on the piston pin boss -1- are facing in the opposite direction of the piston pin lubrication drilling -2-.

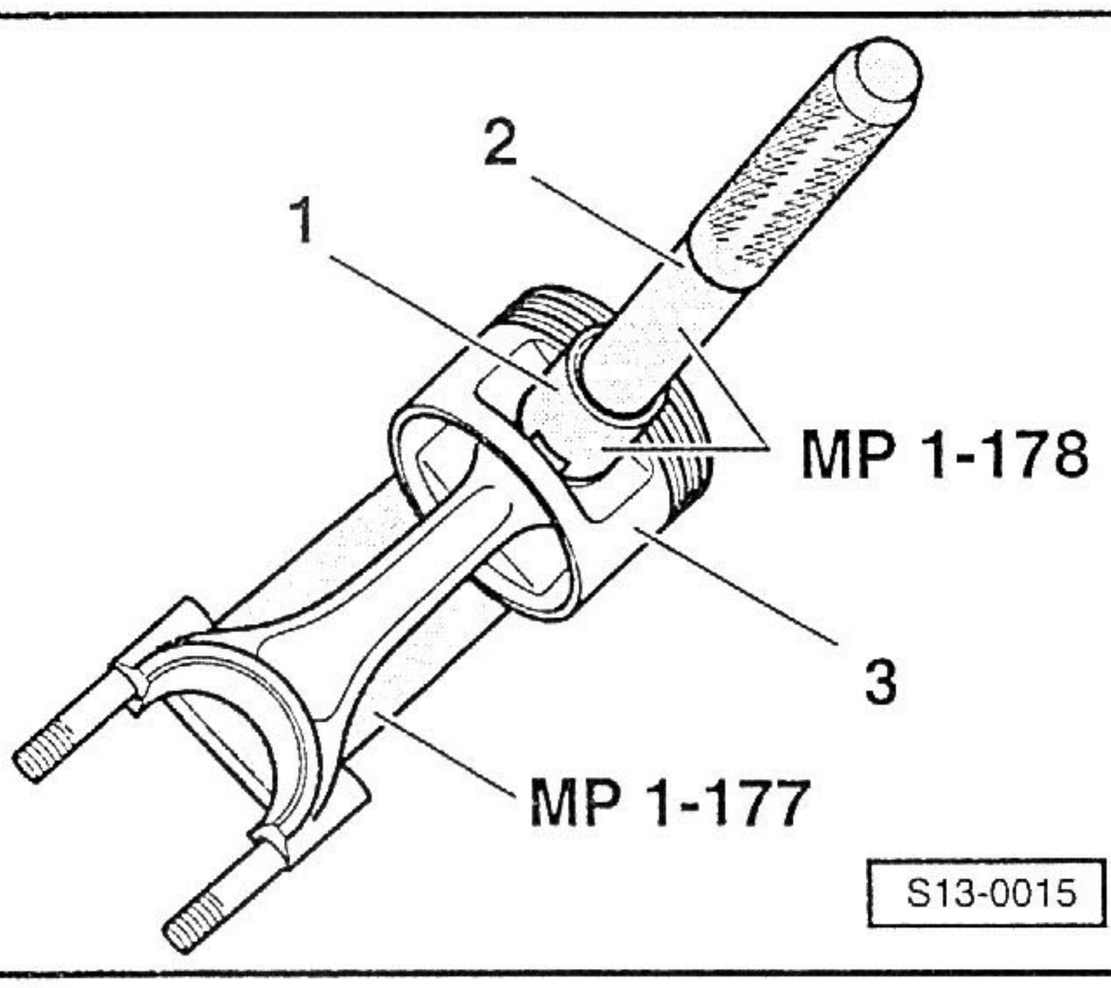


◀ - Place piston together with conrod onto the assembly device MP 1-177.

- Fit on special tool with piston pin and press in with piston pin drift MP 1-178.



◄ - Insert circlip -1- into the sleeve of the assembly device MP 1-178.



◄ - Position sleeve -1- onto the piston pin boss.

- Use the piston pin drift -2- to press the circlip out of the sleeve into the groove of the piston -3-.

Examining conrod

Special tools, testers and aids required

- Scales
- Conrod inspection tool MP 1-159
- Conrod straightener MP 1-103

The conrods have to satisfy certain standards. The following check should be performed:

Check of weight

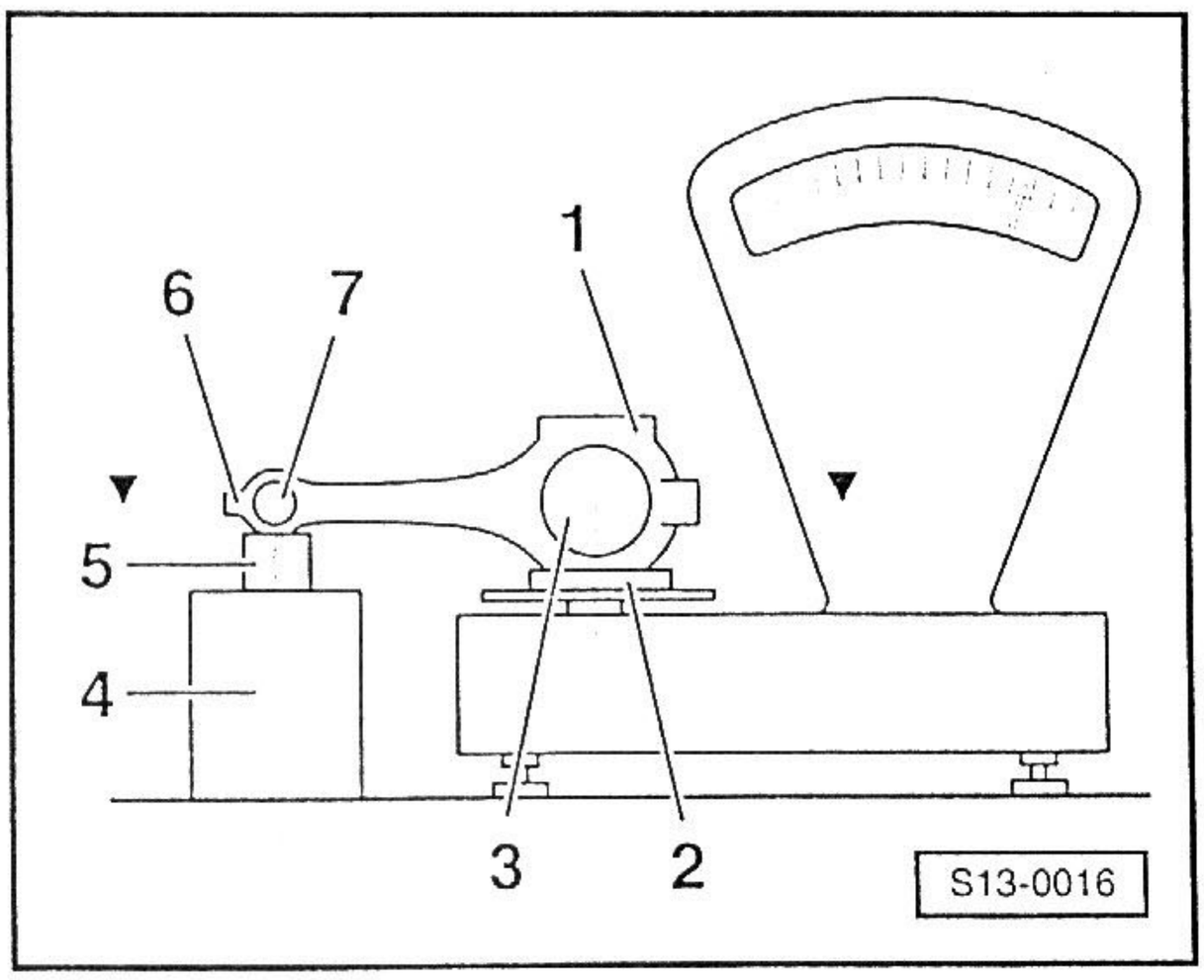
The conrods must all be assigned to the same weight group.

Difference in weight groups 3 to 19 g; max. difference in weight group 8 g.
The lighter group is coloured yellow, the heavier group is coloured blue.

Conrods with no marking should be assigned to the individual groups by weighing.

Notes:

- *Permissible weight difference at conrod little end 4 g ± 2 g.*
- *Permissible difference in weight at conrod big end likewise 4 g ± 2 g.*
- *If the weight of a new conrod is matched to the old one, no tolerances must exist.*
- *Size from forged shoulder of conrod boss must not be less than 15 mm (measured from centre of little end).*
  Size of conrod base must not be less than 35 mm (measured from centre of big end).



Determining weight of conrod boss and conrod big end:

Weighing conrod big end:

- For weighing, place conrod big end -1- with an additional pin -3- onto the supporting edges -2-.

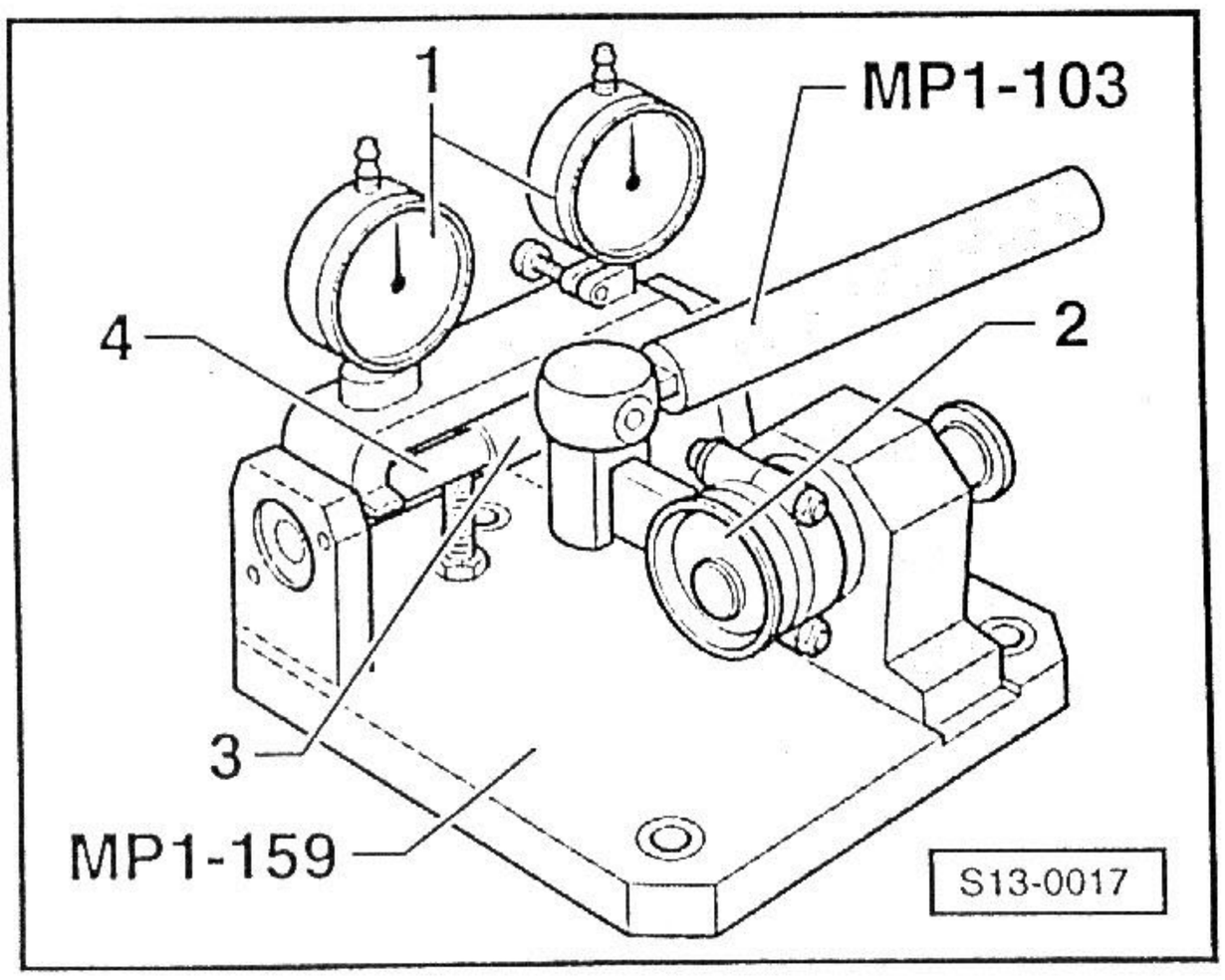
- Push piston pin -7- into conrod little end -6- and place conrod boss onto the supporting edges -5- and the support of the conrod -4-.

Calculate weight of the conrod little end:

Total weight of conrod
\- Weight of conrod big end
= Weight of conrod little end

Note:

The weight can also be calculated by weighing. This is done in the same way as weighing the conrod big end, but in this case the conrod little end is placed on the scales.



Checking parallelism

This check involves determining the parallelism of the conrod bush to the conrod bearing.

- Insert auxiliary piston pin -3- and adjusting pin -4-.

- Attach conrod to the conrod inspection device MP 1-159 with the attachment -2-.

- Read off the difference in parallelism. The difference indicated on the dial gauges must not be greater than 0.03 mm over a length of 100 mm.

- The difference can be corrected with the straightener MP-103.

Dimension of bearing shells for conrod bearings

Notes:

- *The bearing shells can be installed as desired. The size is determined by measuring the wall thickness with a precision micrometer.*
- *The bearing shells should be installed to match the nominal size of the conrod bearing journals (pay attention to grinding groups)!*
- *Thickness of bearing shells ⇒ Table below.*

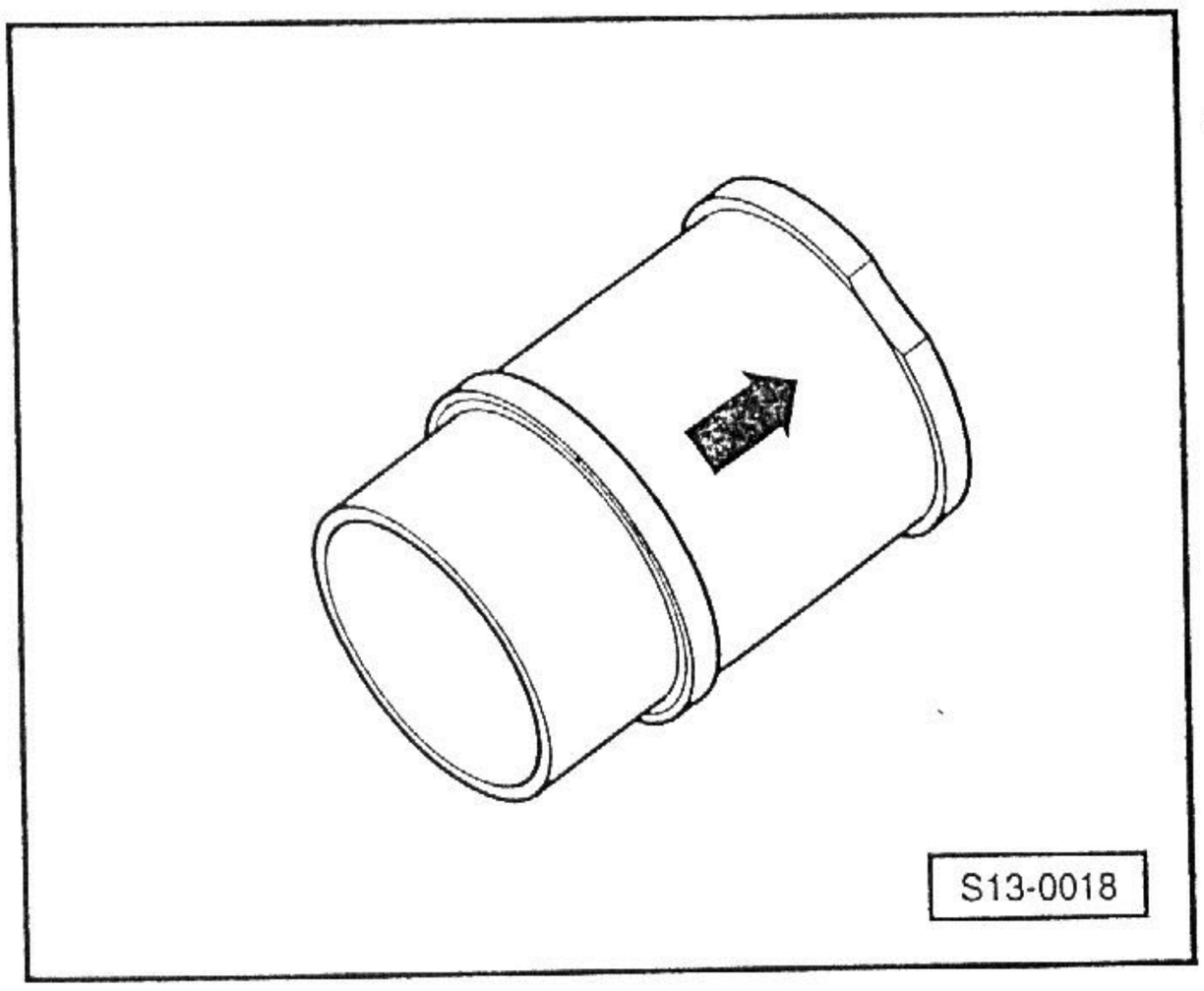
	Wall thickness mm	Thickness tolerance mm	Bearing shell ∅ mm	Abnormal ∅ mm
Basic size	1.490		45	
I. grinding	1.615	+0.000		44.75
II. grinding	1.740	-0.007		44.50
III. grinding	1.865			44.25

Removing and installing and gauging liner

Special tools, testers and aids required

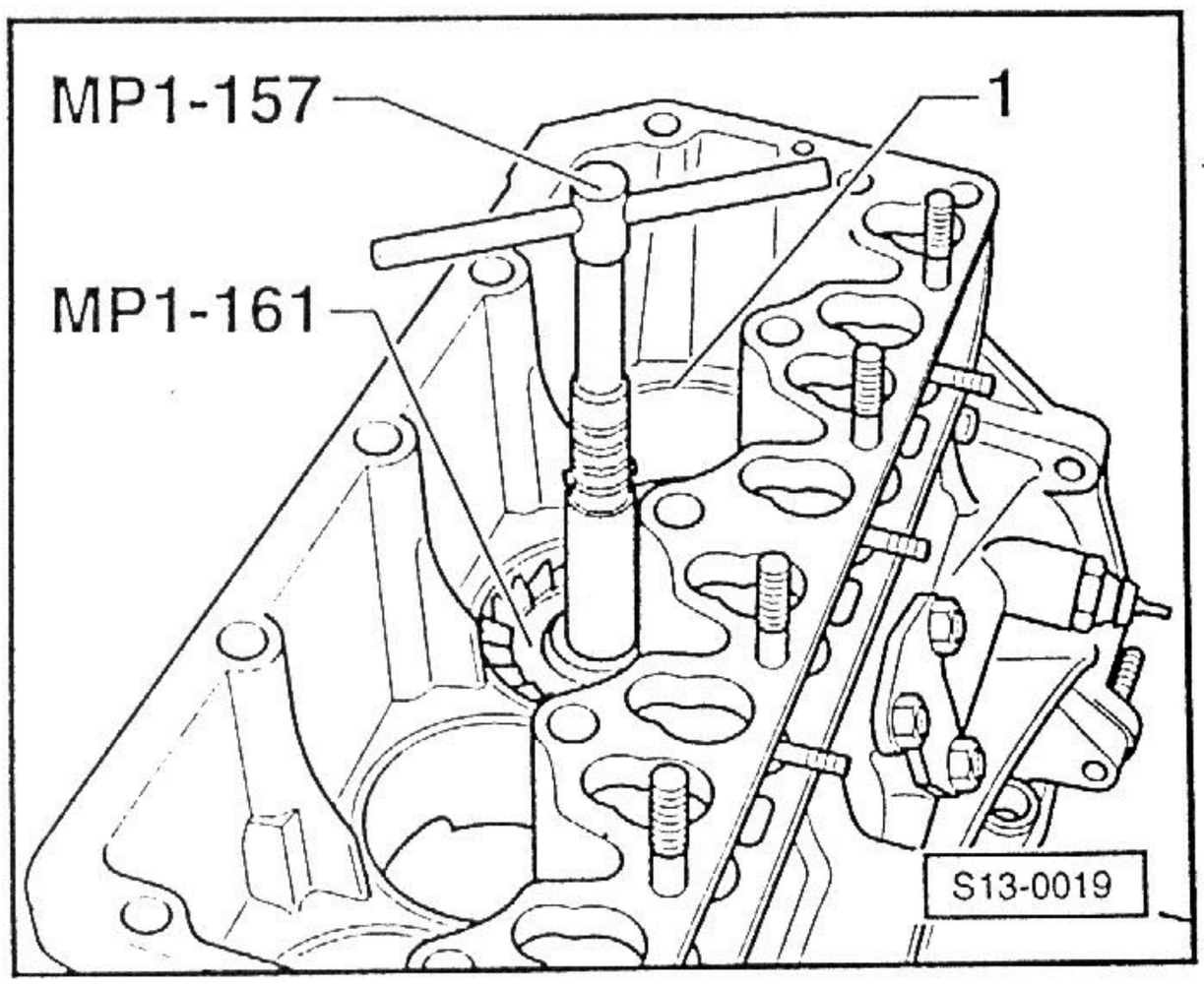
- Instrument for measuring liner protrusion MP 1-107
- Milling device for liner seat MP 1-157
- Milling tool for milling device MP 1-161
- Dial gauge
- Cylinder liner ejector MP 1-105/1

The liners are removed with the tool MP 1-105/1.



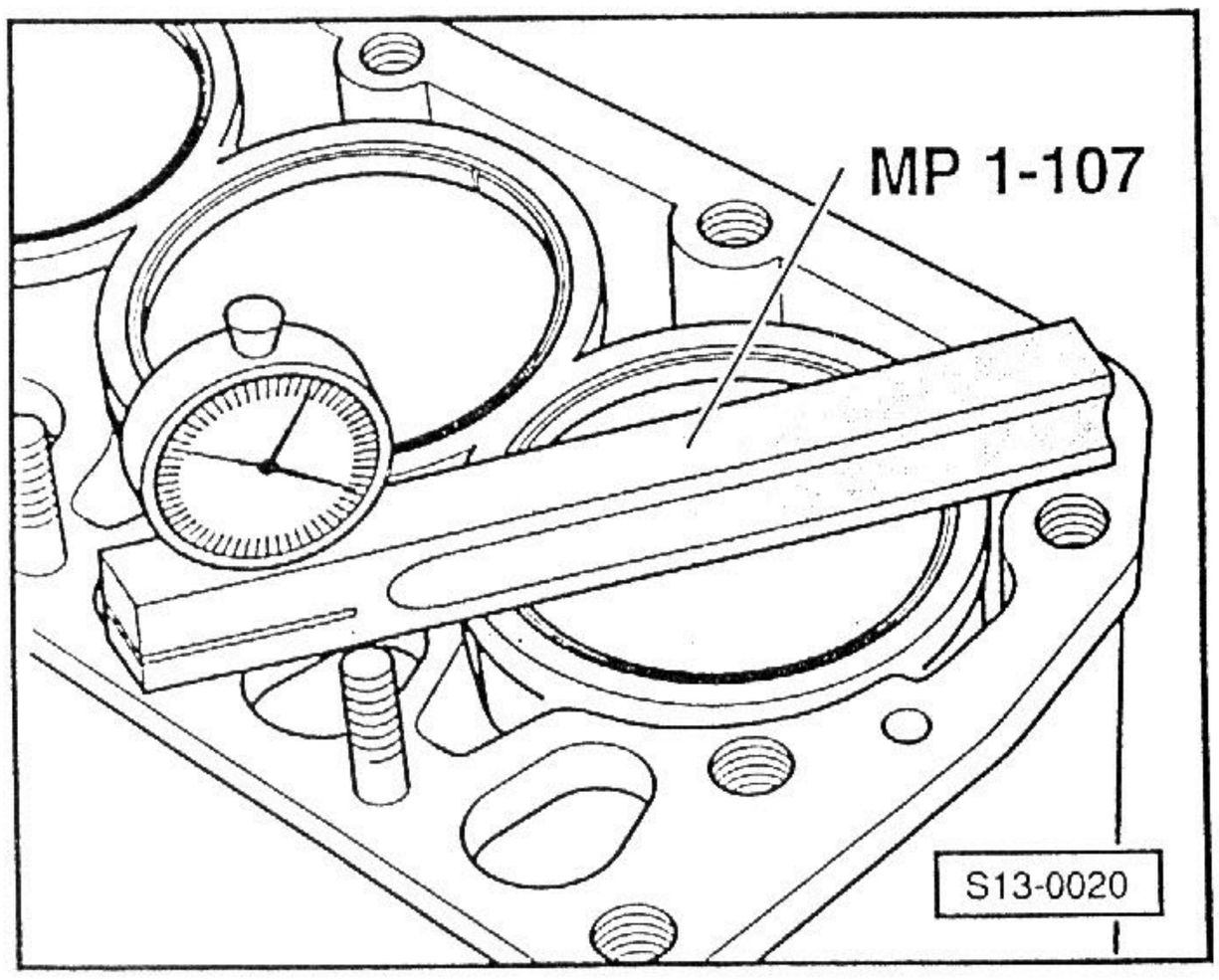
◀ The liners are classified into the tolerance groups A, B, C. The tolerance group is indicated on the outer diameter.

Tolerance group	Ø mm	Tolerances Ø mm
A	75.50	+0.000...0.010
B	75.50	+0.011...0.020
C	75.50	+0.021...0.030



◀ - The seat surfaces -1- for the liners must be clean and flat.

- If chemical cleaning is not possible or if it is necessary to remove unevennesses, the surface of the seat must be carefully reworked with the milling tool MP 1-161 and the milling device MP 1-157.

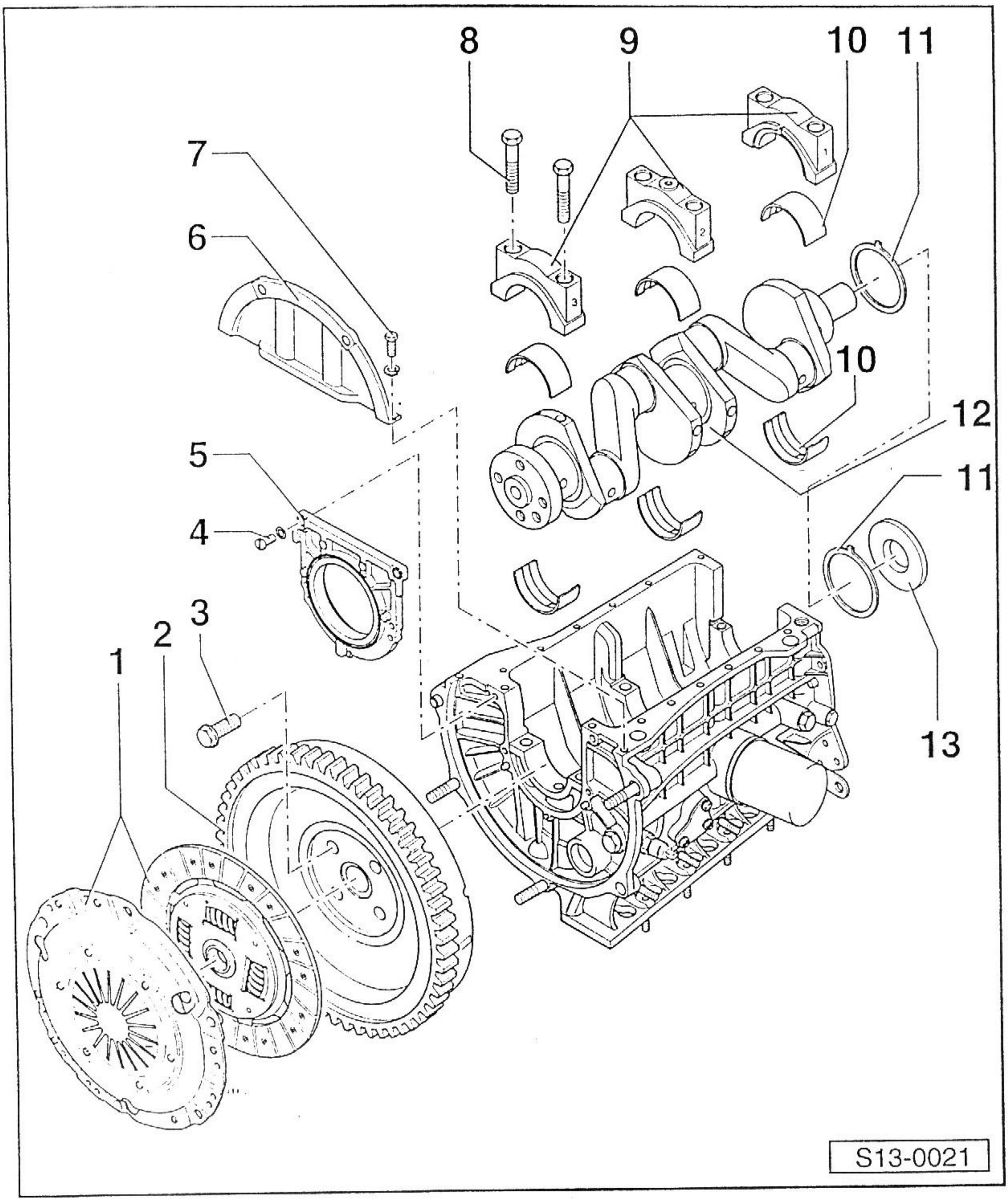


◀ - Examine protrusion of the liners. It should be 0.07...0.12 mm; correct with shims, if necessary.

Notes:

- *Shims are available in the thicknesses 0.10; 0.12 and 0.14 mm.*
- *The difference of the liners to each other must not be more than 0.04 mm.*

Removing and installing crankshaft/flywheel

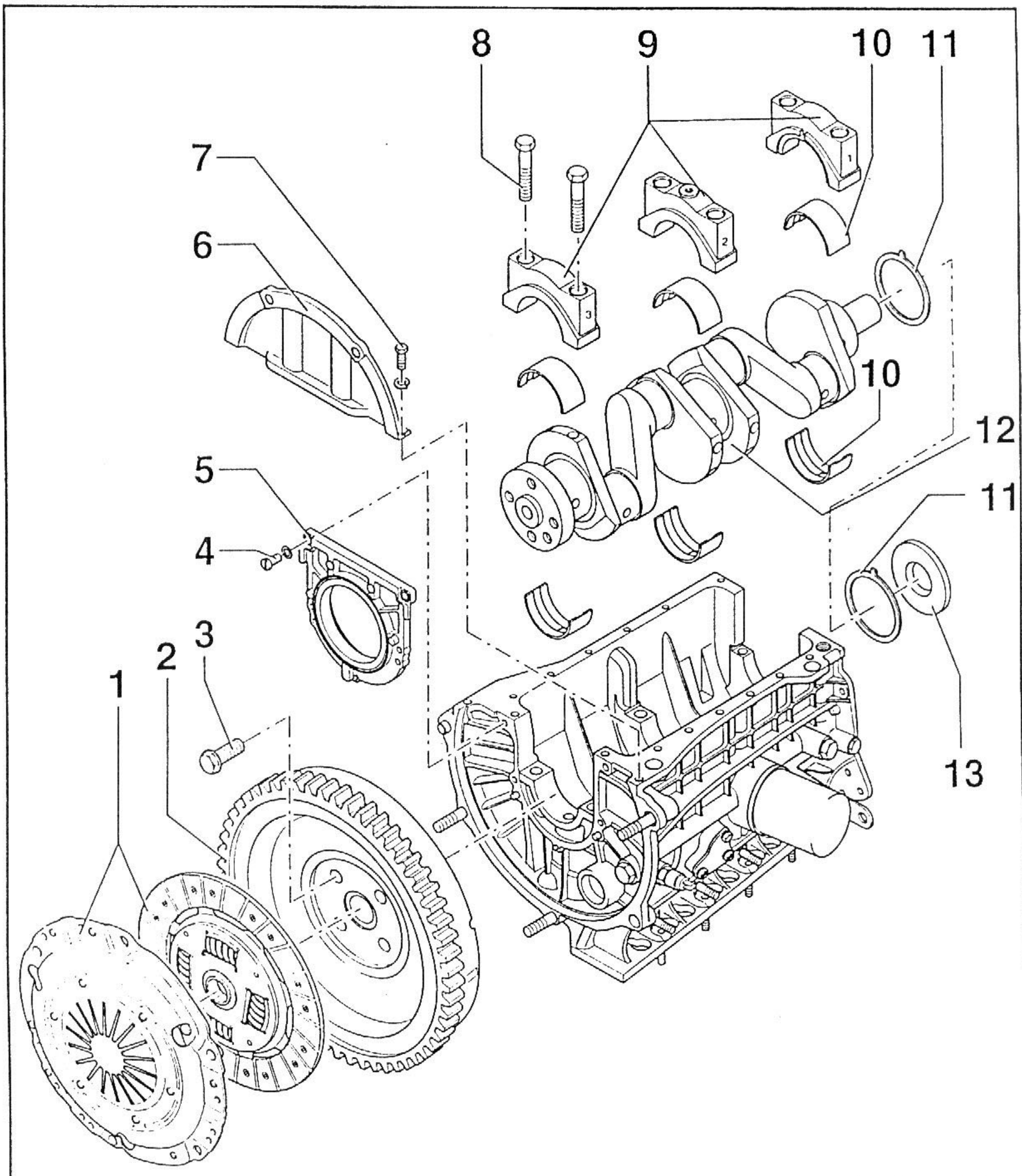


1 - Clutch
- Removing and installing ⇒ 5-Speed Manual Gearbox; Repair Group 30; Removing and installing clutch

2 - Flywheel
- Removing and installing ⇒ page 13-17
- Reworking ⇒ page 13-19
- Replacing ring gear ⇒ page 13-18

3 - Hexagon bolts
- Secure with Loctite 574 or 270
- 30 Nm + torque a further 1/4 turn (90°)
- Replace

4 - Bolt
- 8 Nm



5 - Sealing flange with seal
- Seal can be replaced separately
- Seal with Loctite 574

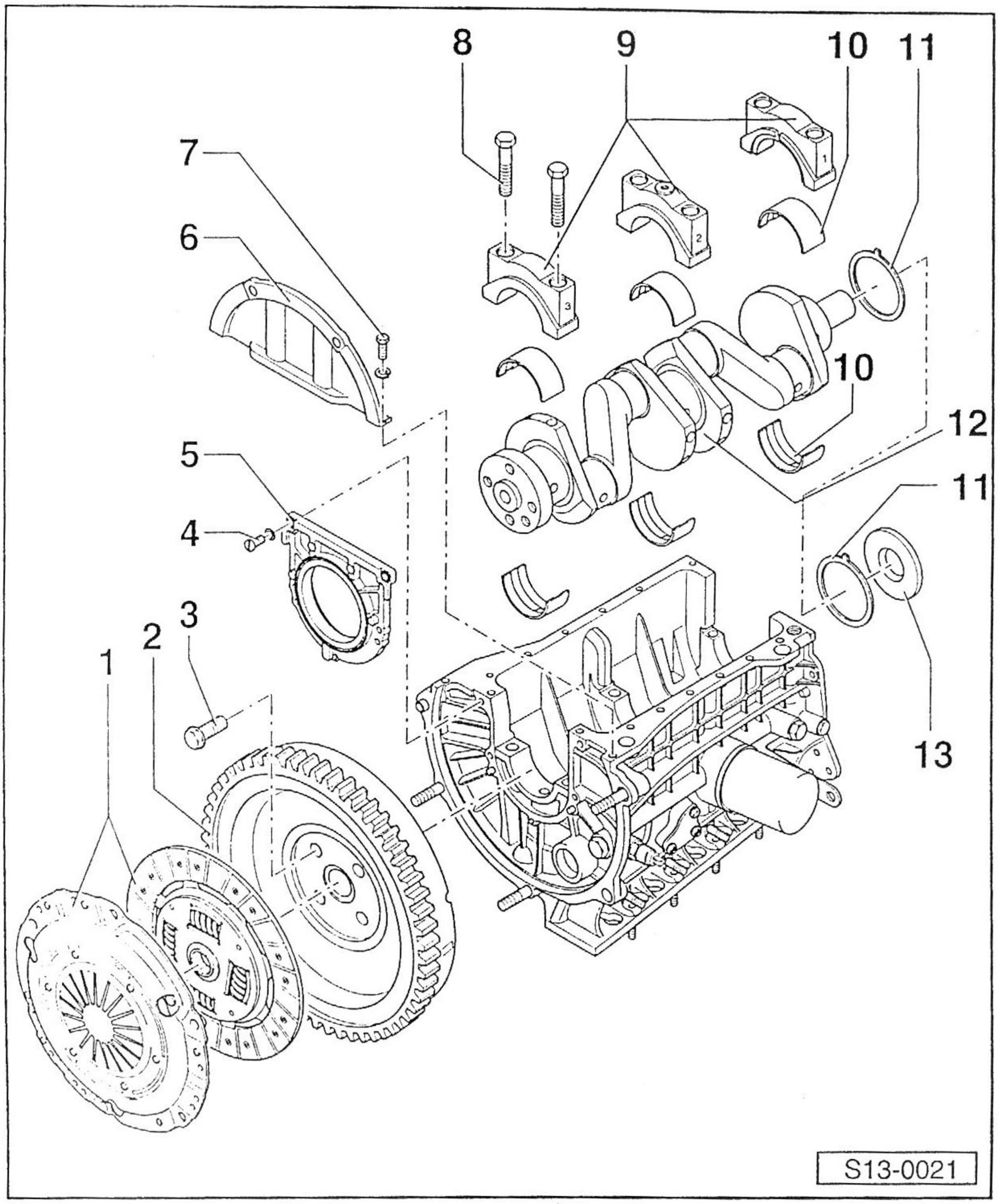
6 - Cover

7 - Hexagon bolt
- 10 Nm

8 - Hexagon bolt
- 75 Nm

9 - Main bearing cap
- Bearing cap 1: timing chain end
- Bearing cap 1 with recess for guide ring

10 - Main bearing shell
- Pay attention to fitting location
- Do not mix up used bearing shells (mark)
- Ensure tightly seated in retaining lugs
- Install, beginning with bearing cap 1
- If a bearing shell is worn, replace all bearing shells
- Dimension of bearing shells matched to nominal size of crankshaft ⇒ page 13-17



11 - Guide rings

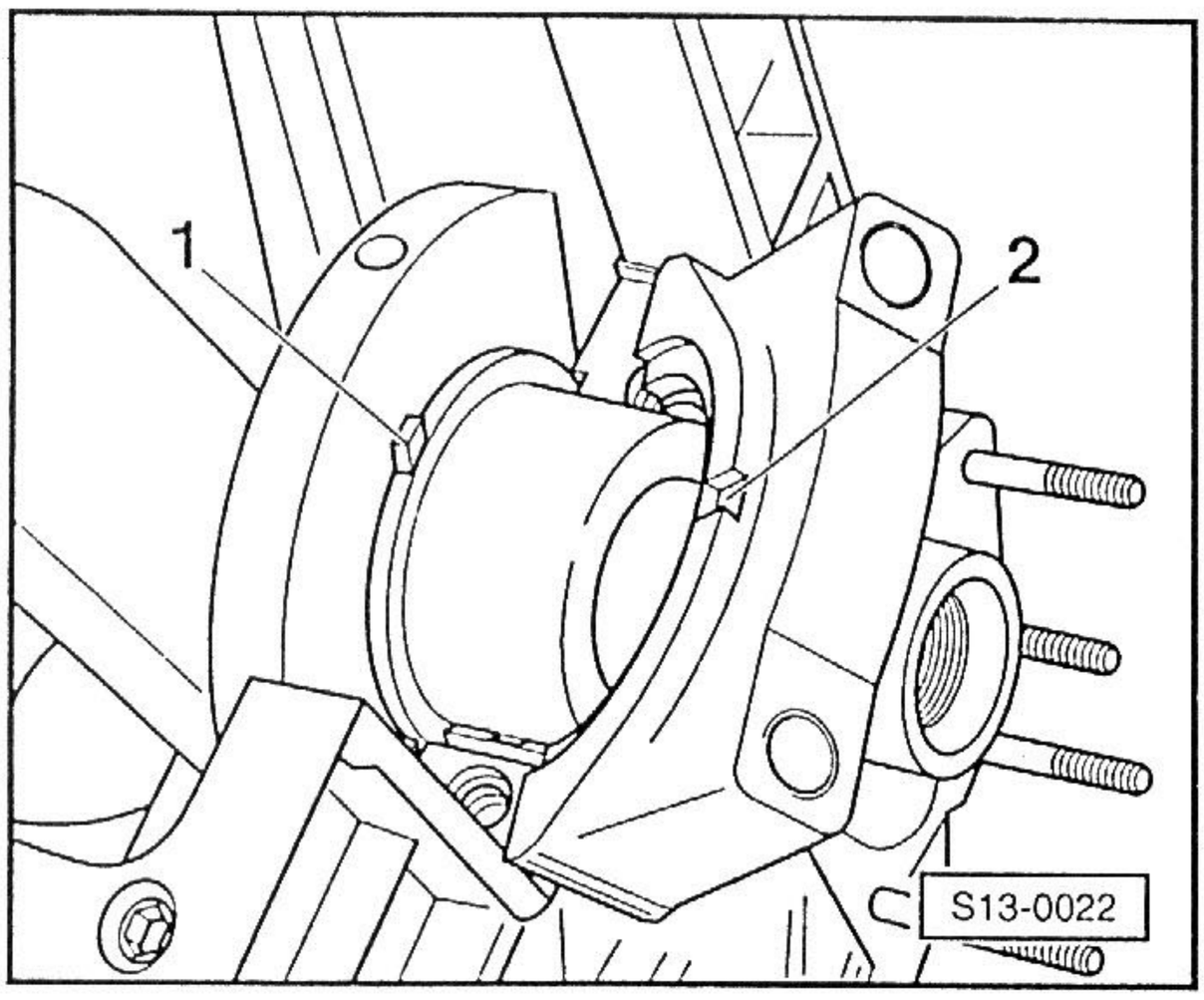
- The two guide rings are separated by the main bearing cap 1. Use an oversize inner quide ring, at crankshaft side when the crankshaft thrust face has been reground.
- Use only an outer quide ring of standard size on the supporting ring side.
- Lubricating grooves face away from cap 1.
- Pay attention to locating element ⇒ Fig. 1
- Thickness ⇒ page 13-16

12 - Crankshaft

- Grinding ⇒ page 13-15
- Examining axial play ⇒ page 13-16

13 - Supporting ring

- Inner chamfer faces toward cylinder block

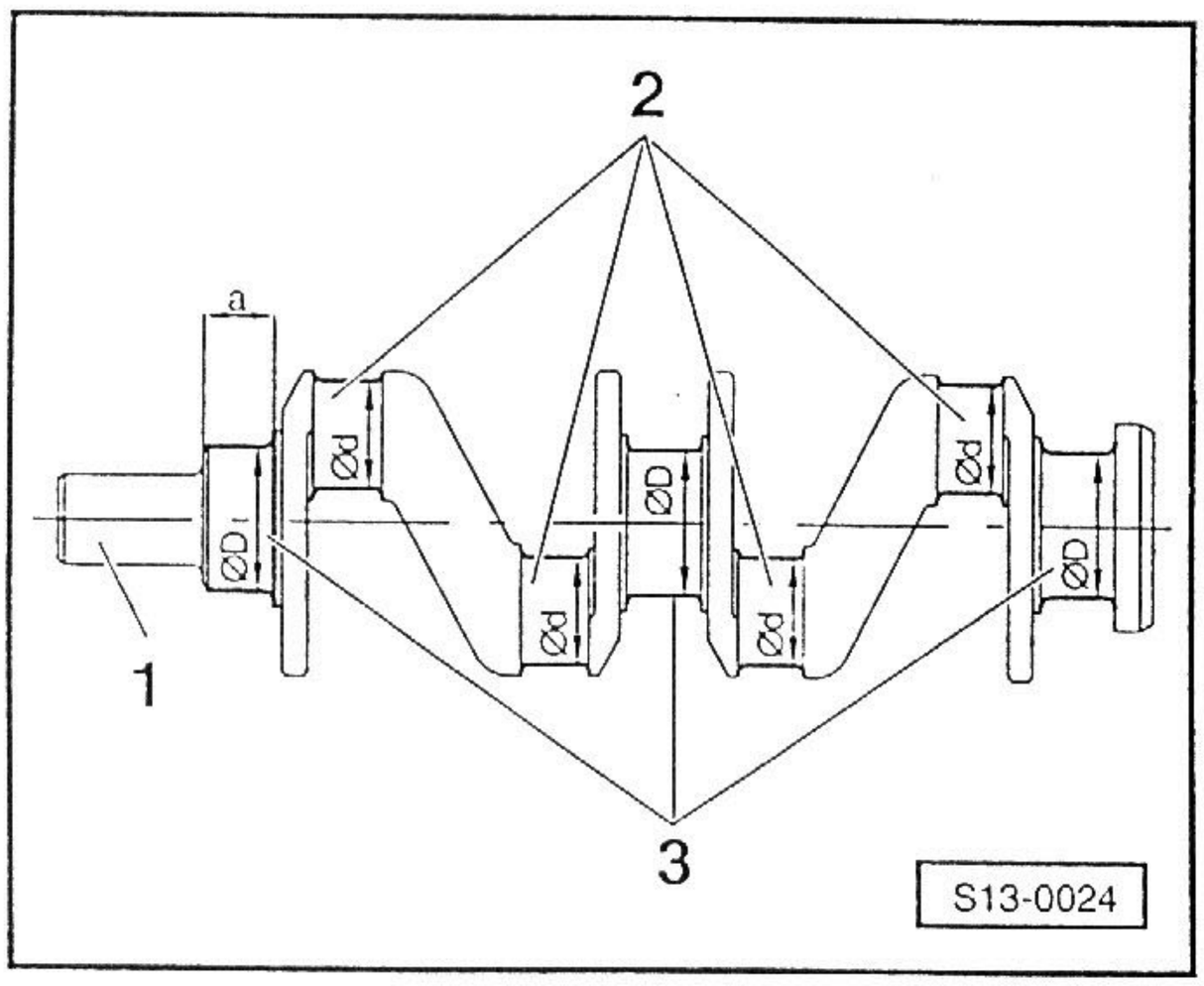


◄ **Fig. 1 Locating element of guide ring**

- The lug -1- of the guide ring must be located in the slot -2- of the bearing cap 1.

- The oil grooves of the guide ring must face towards the crankshaft face.

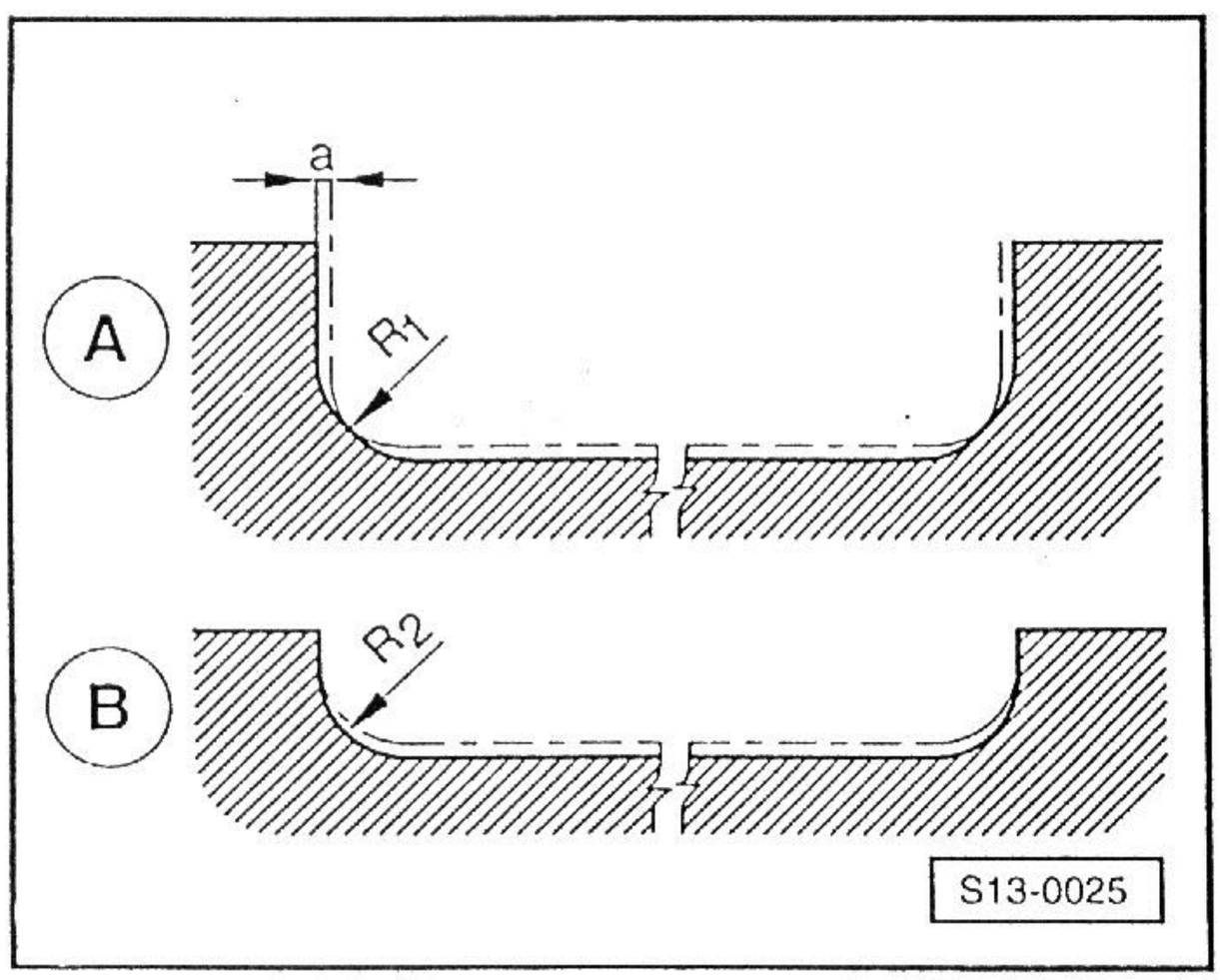
- To compensate for increased axial play as a result of grinding, the thicker guide ring must be positioned on the ground side. A guide ring with standard size must be fitted to the supporting ring side (outer side).



Grinding crankshaft

If the crankshaft has an excessive bearing play or signs of wear, it can be re-ground in three stages. Following this, the oversize main and conrod bearing shells must be installed.

◄ Item -2- Conrod journal
Item -3- Main bearing journal



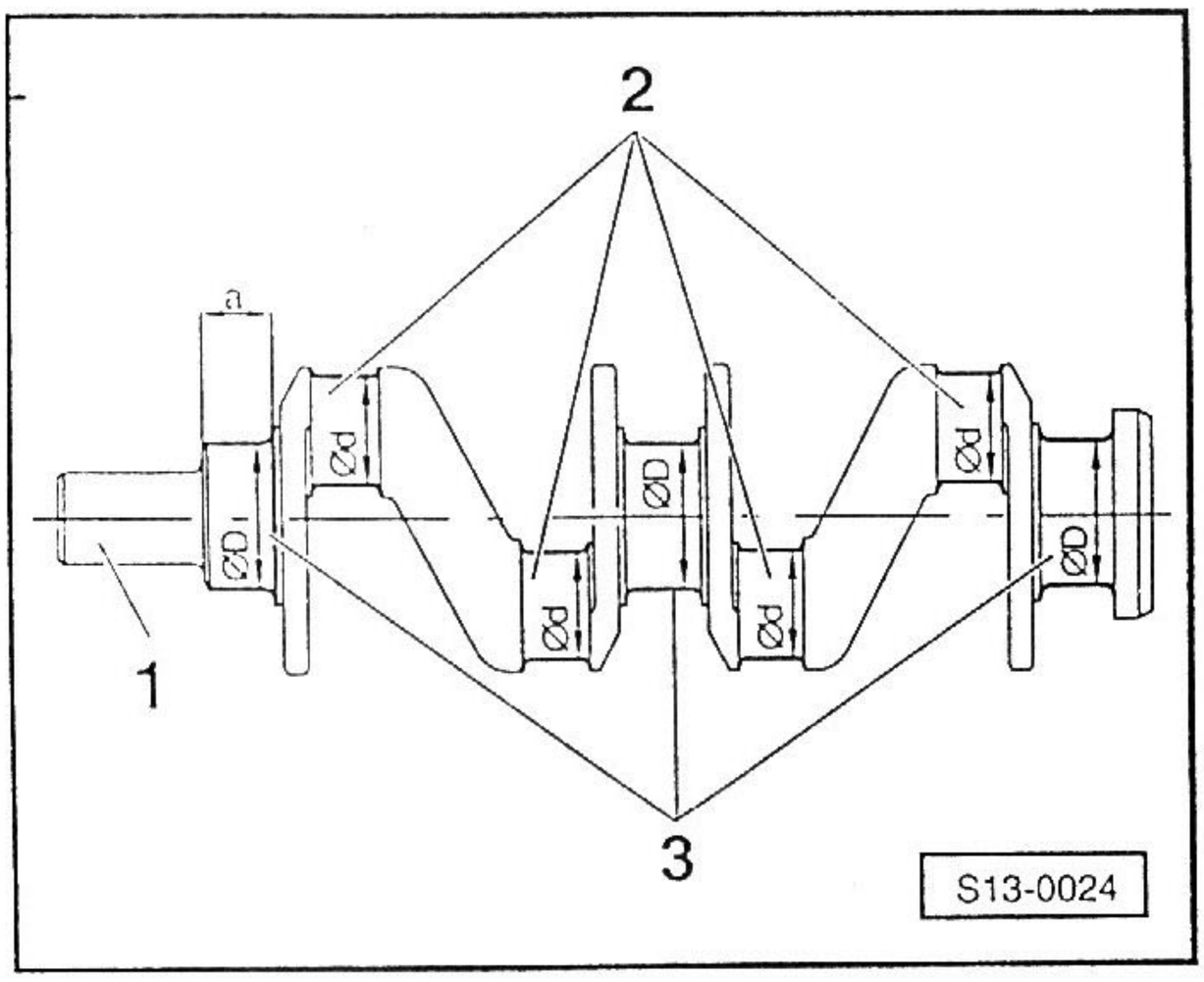
Notes:

- *The crankshaft is ground in special grinding shops.*
- *Use a grinding tool with a stroke of 36 ± 0.05 mm for grinding work at the conrod bearing.*
- ◄ *Use grinding wheels for grinding the main bearing journals and conrod bearing journals:*

A - Main bearing Ø D R_1 *3.2 ± 0.4*

a 0.2 + 0.0 - 0.2

B - Conrod bearing Ø d R_2 *2.5 + 0.0 - 0.2*



- *It is only permissable to grind the circumference of all the bearing points, with the exception of the first -1- at which the face end can also be ground.*
- *The side faces of the conrod bearing journals may be touched without enlarging the width of the journal.*
- *The conrod bearing journals must not differ by more than 30' relative to the plane of the main bearing.*

Dimensions for grinding crankshaft

Crankshaft bearing journal Ø	Ø D mm	Tolerance Ø D mm	Ø d mm	Tolerance Ø d mm	Length a mm	Tolerance a mm
Basic size	60		45		31.5	
I. grinding	59.75	-0.010	44.75	-0.009	31.625	+0.025
II. grinding	59.50	-0.029	44.50	-0.025	31.75	-0.000
III. grinding	59.25		44.25		31.875	

Examining axial play

- The crankshaft must rotate freely without any noticeable axial play.

- Check the axial play of 0.04...0.1 mm with a dial gauge positioned above a contact surface, (e.g. for flywheel).

- If the axial play is excessive after grinding a crankshaft, the axial play can be corrected by using guide rings of a different thickness.

	Thickness of guide ring mm	Thickness tolerance mm
Basic size	1.490	
I. grinding	1.615	+0.000
II. grinding	1.740	-0.010
III. grinding	1.865	

Dimensions of main bearing shells

	Wall thick-ness mm	Thick-ness toleran-ce mm	Bearing shell Ø mm	Over-size Ø mm
Basic dimension	2.495	+0.000 -0.010	60.0	
Grinding I	2.620			59.75
Grinding II	2.740			59.50
Grinding III	2.870			59.25

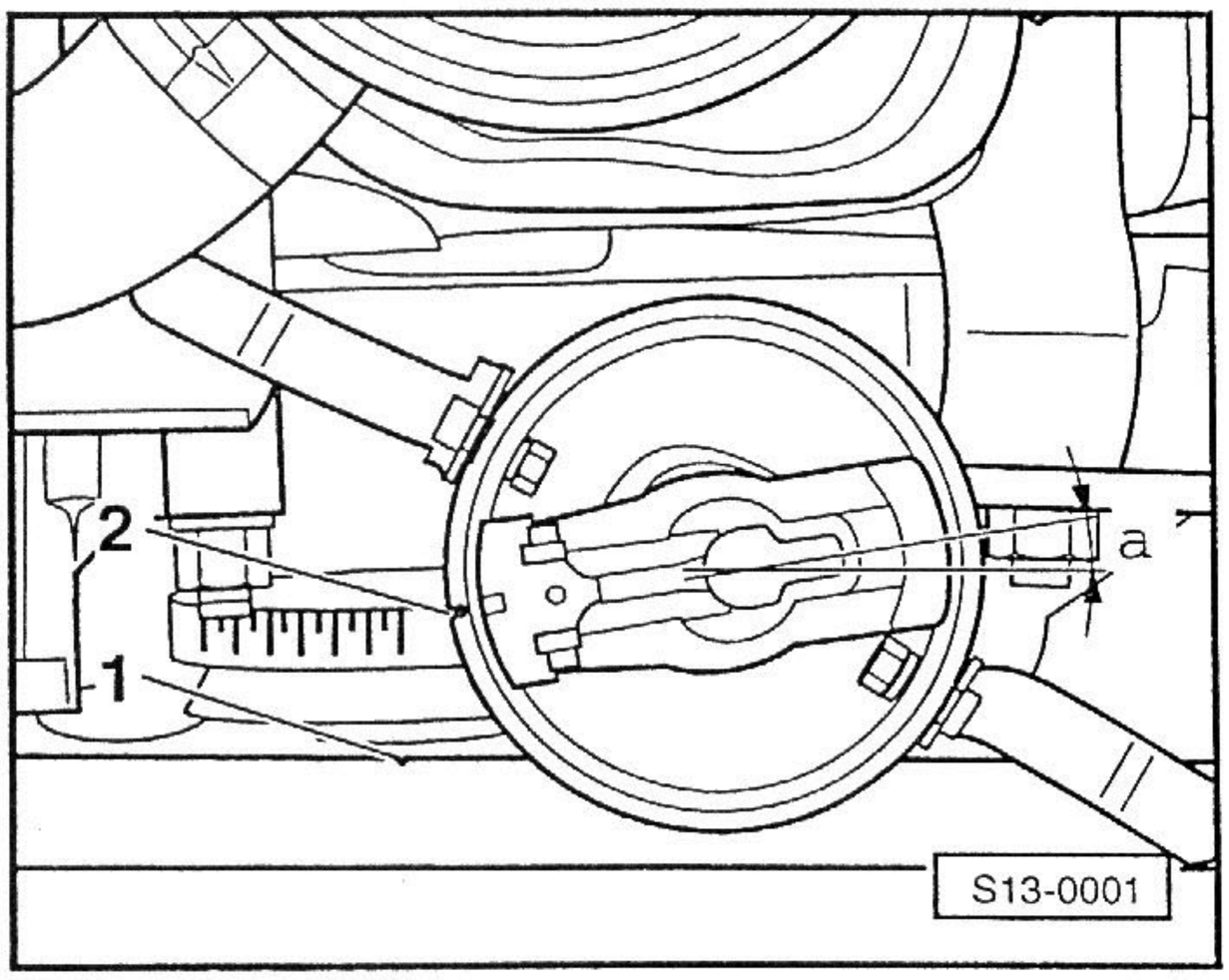
Removing and installing flywheel

Special tools, testers and aids required

- Flywheel lock MP 1-504

Notes:

- *In order to remove the flywheel when carrying out repairs (e.g. sealing work at crankshaft), the flywheel has to be marked relative to the crankshaft in order to be able to re-install it subsequently in the original installation position.*
- *If the flywheel is replaced by a new one, installation is carried out as described on page 13-18.*



Removing

For engines with distributor 135, 135B, 136B

- Crank engine to TDC position of cylinder 1 by moving the belt pulley of the crankshaft and the distributor to the following positions:

◄ ♦ Position -1-, marking on crankshaft belt pulley is positioned opposite the marking 0 on the engine block.

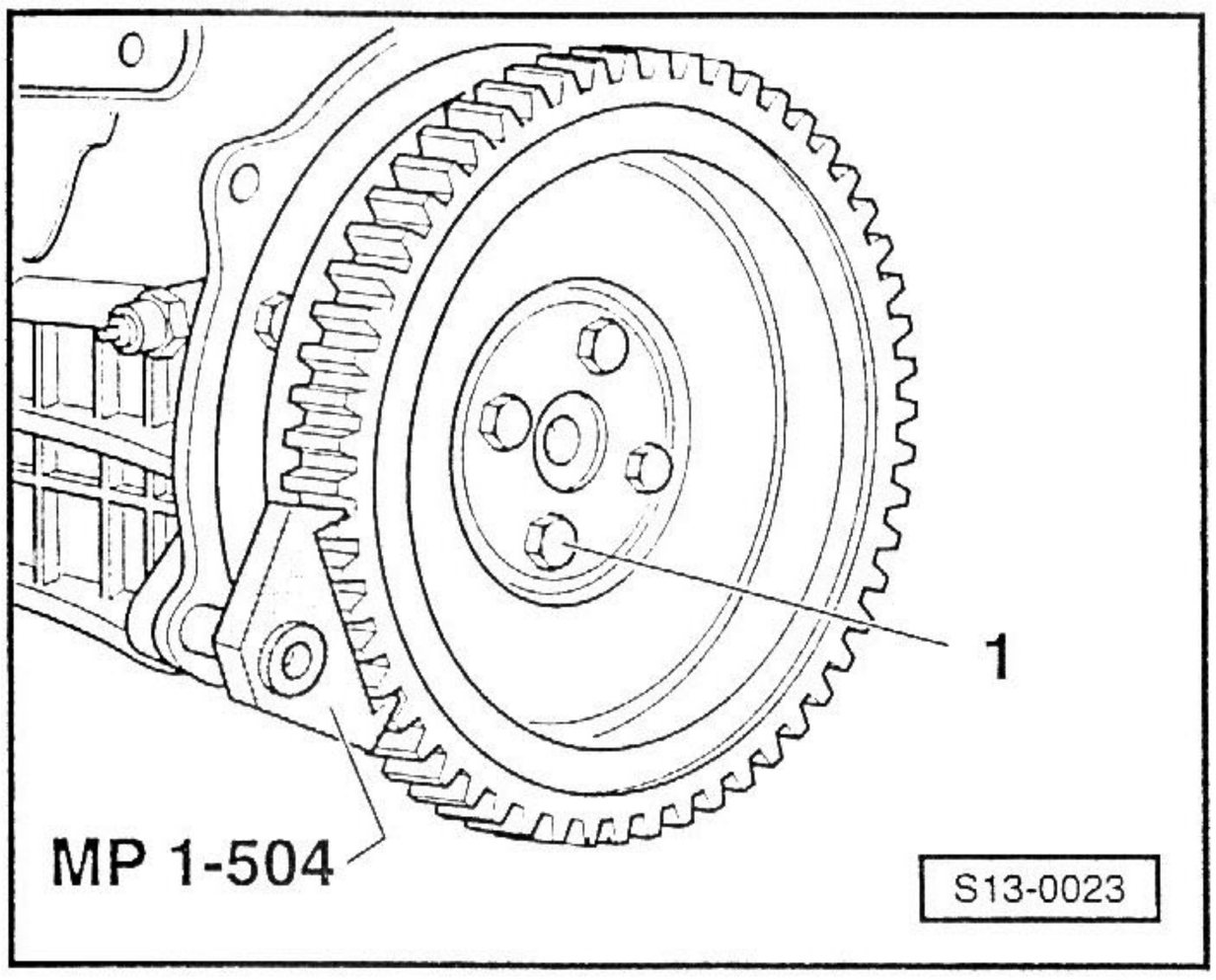
♦ Position -2-, distributor rotor arm is positioned opposite the marking -dot- on the distributor housing (installation position of distributor in engine at the angle alpha = approx. 15°)

For engines 135M, 136M

- Remove cylinder head cover.

- Crank engine to TDC position of cylinder 1 by moving crankshaft belt pulley and valve gear to the following position:

♦ Marking on crankshaft belt pulley is positioned opposite the marking 0 on the engine block.



- Valves of cylinder 4 are open.

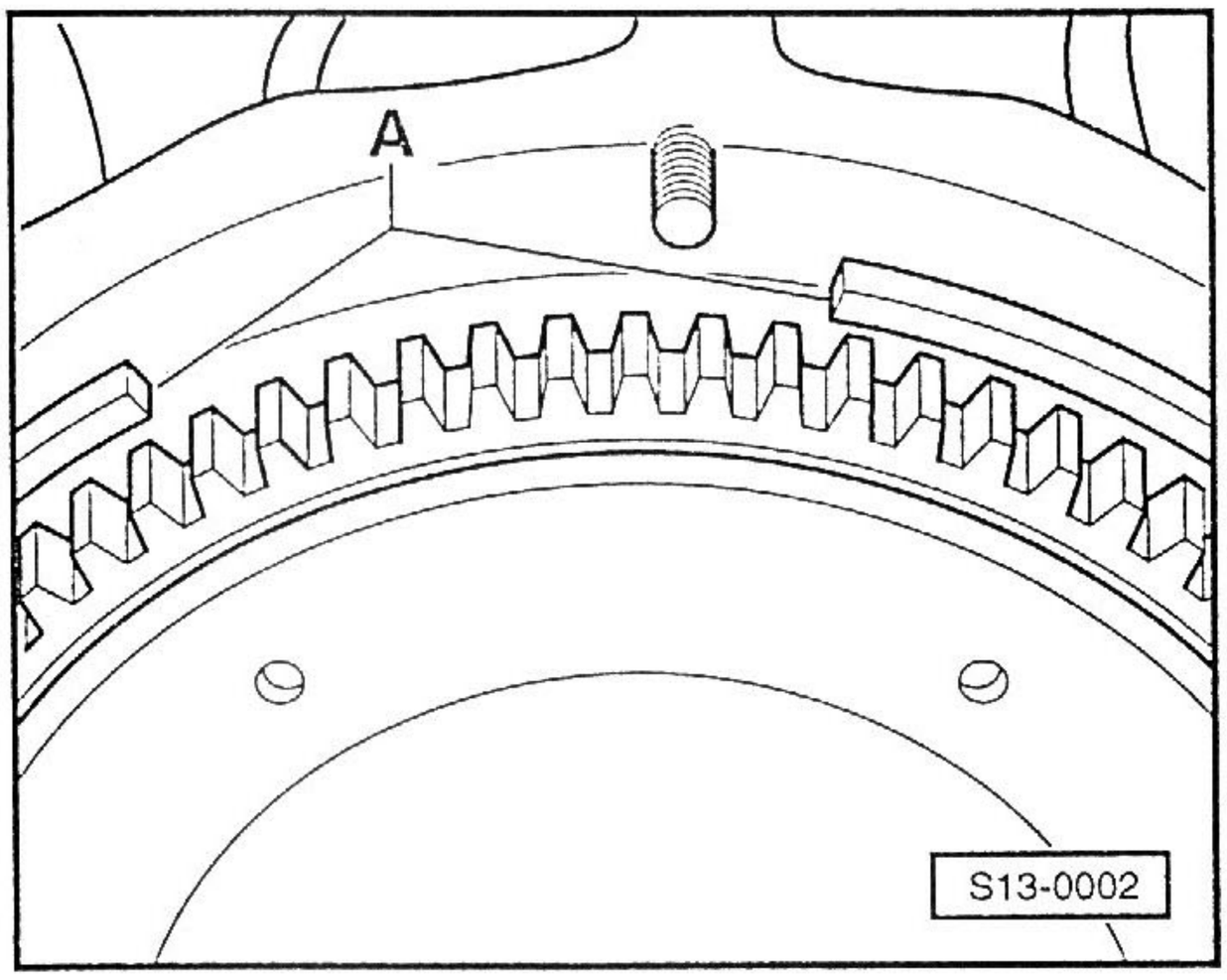
Continued for all models

- Lock flywheel in position with flywheel lock MP 1-504.

- Unscrew bolts -1- and take off flywheel.

Note:

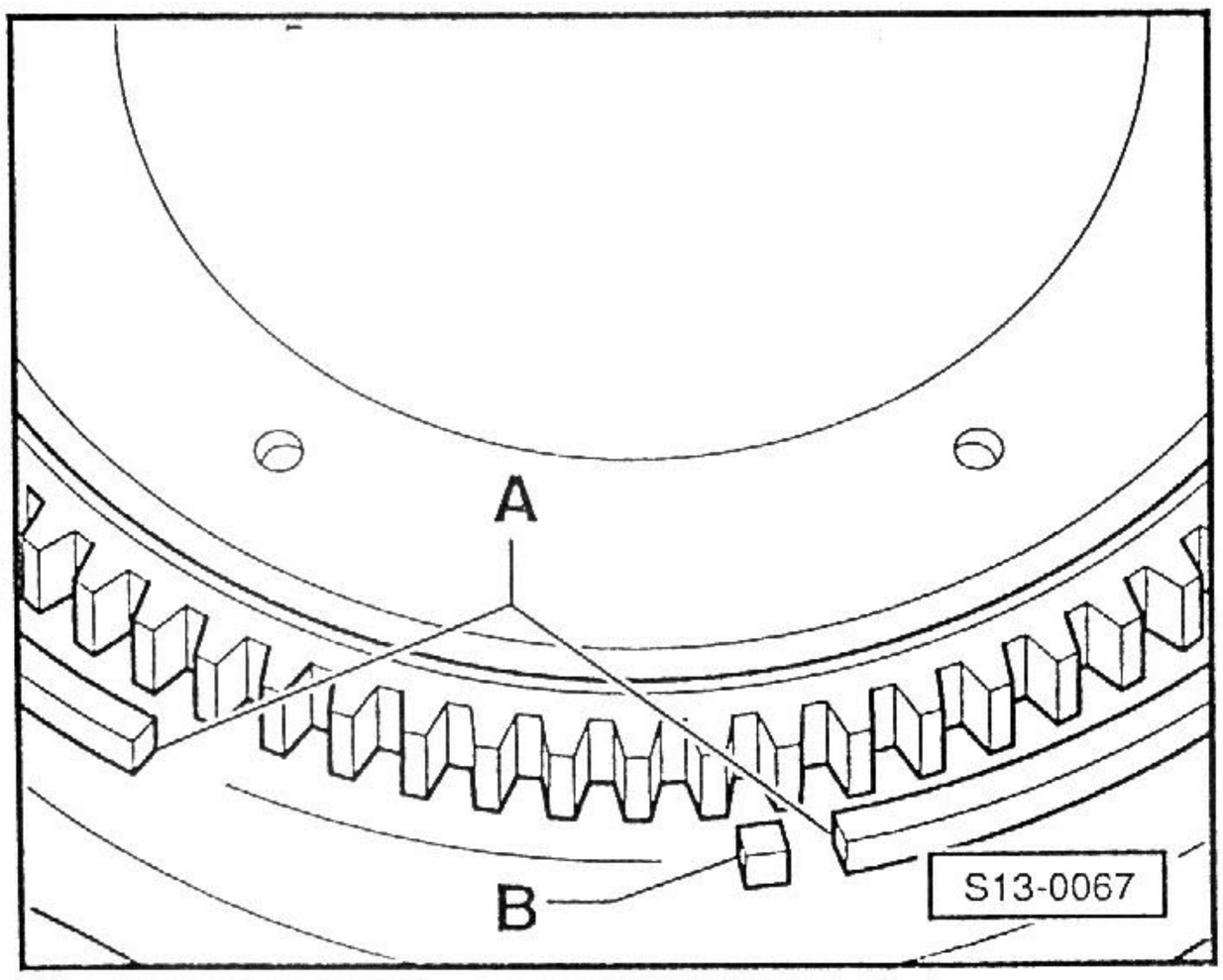
Strike the bolts removed immediately with a hammer in order to render the thread unusable and dispose of them as scrap.



Installing

For models with distributor 135, 135B, 136B

- Position flywheel so that one segment opening (formed by the control edges -A-) is facing toward cylinder head.



For models 135M, 136M

- Position flywheel so that one segment opening (formed by the control edges -A- and tooth -B-) is facing the engine oil sump.

Continued for all models

- Insert new bolts with Loctite 574 or 270, respectively.

- Tighten bolts in two stages.

- 1. Tighten initially with torque wrench:

  Stage I = 30 Nm

  2. Torque finally with a rigid wrench:

  Stage II = ¼ turn (90 degrees)

Replacing ring gear

Note:

When taking off the ring gear, ensure that the shrink fit is not altered (output).

Removing:

- The ring gear can be removed by pulling off or by destroying.

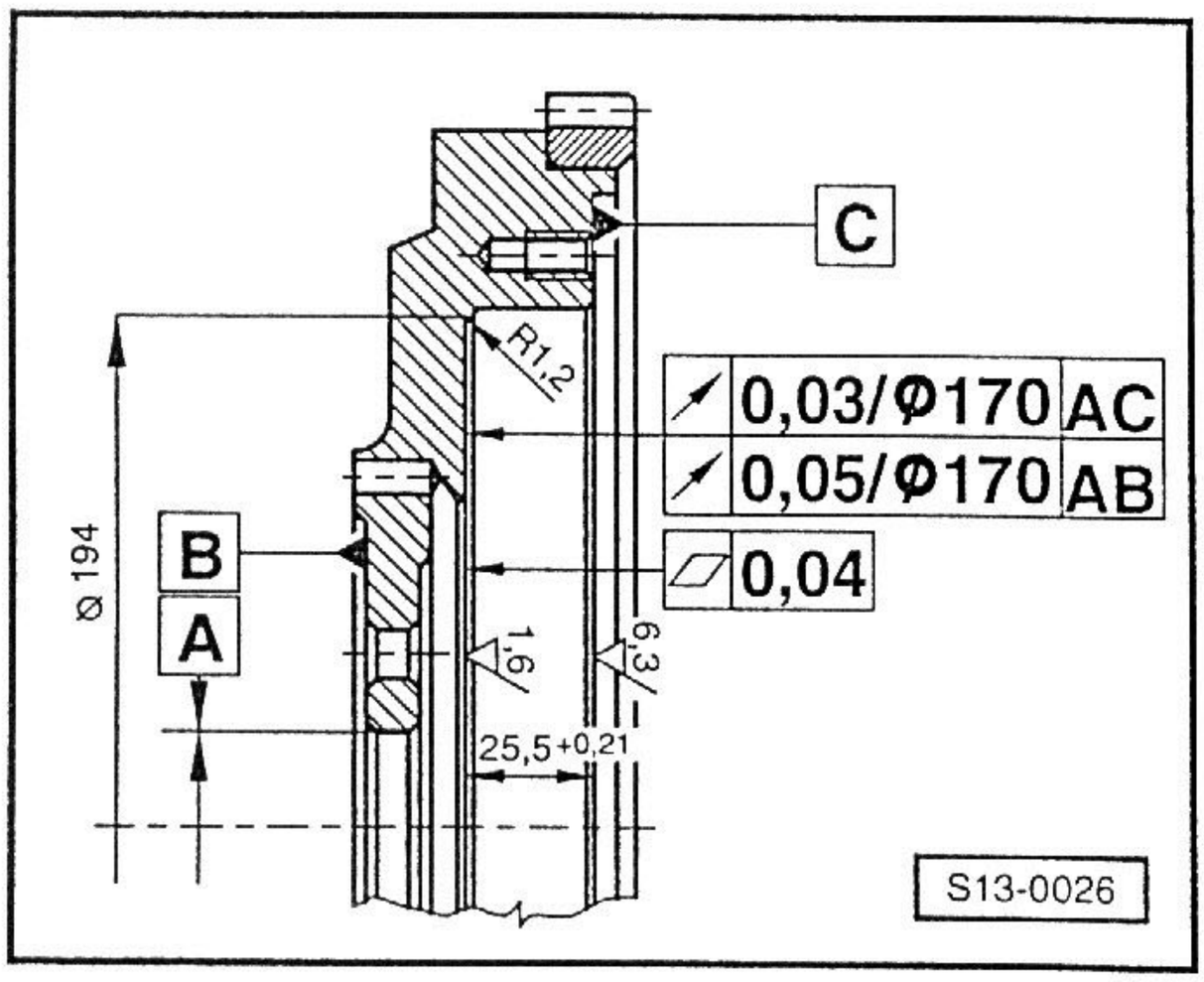
♦ If the ring gear is pulled off, heat it moderately first of all and remove it from the flywheel by striking.

♦ If the ring gear is destroyed in order to remove it, grind the face end sufficiently until the hardening layer is worn away. Then, drill a hole of ∅ 12 ... 13 mm below a tooth gap (do not damage flywheel).

Fitting on

- Heat ring gear in an oven to 180 ... 200°C.

- Place ring gear onto flat plate and inset flywheel, apply slight blows to position.



Clutch plates - friction face

◄ - If reworking, pay attention to the following:

♦ Maintain parallelism of the contact faces between crankshaft and clutch cover.

♦ Maintain clearance of 25.5 + 0.21 mm.

♦ Face end tolerance

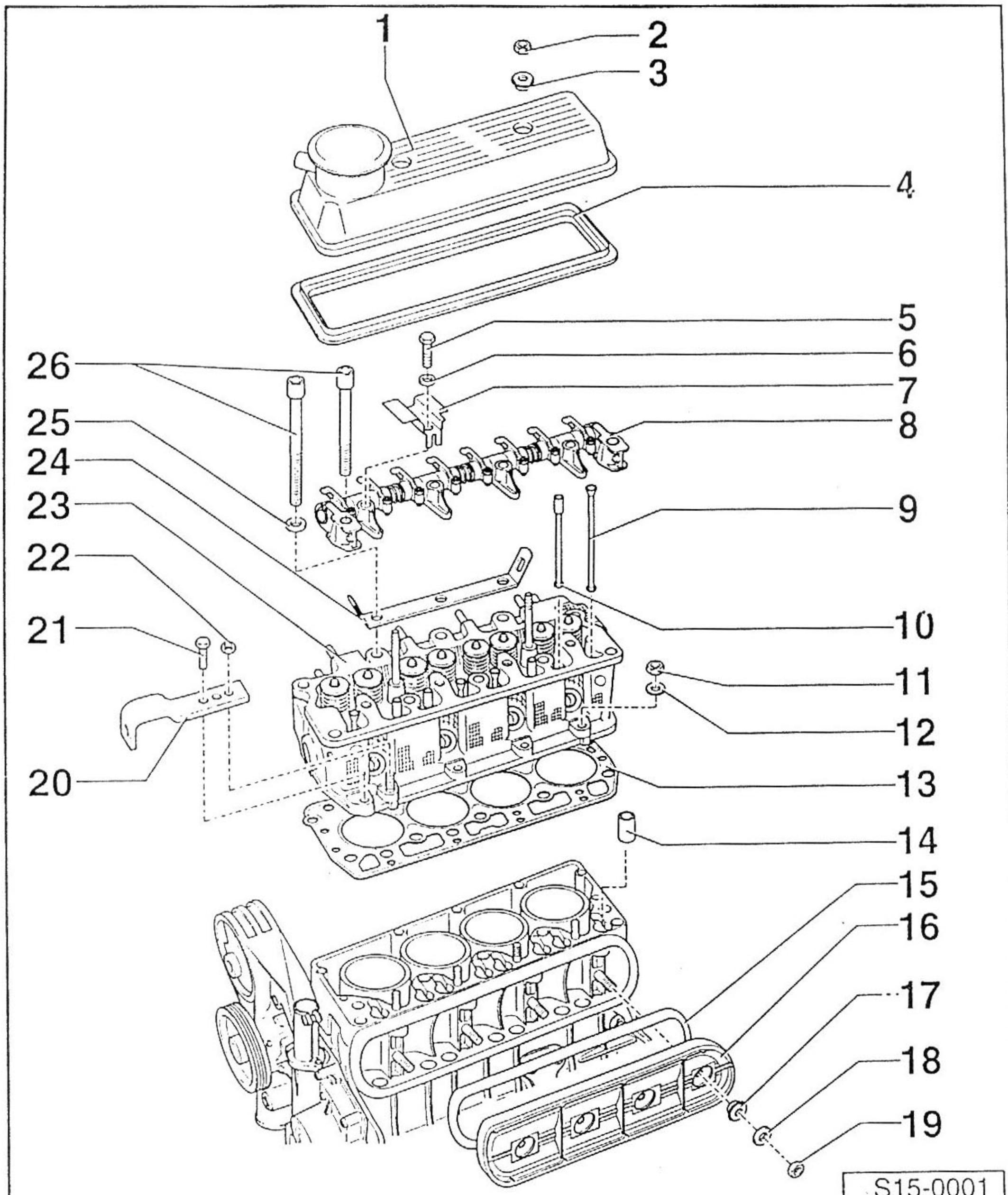
- measured at ∅ 170 mm

- permissible 0.05 mm, measured at crankshaft contact surface

- permissible 0.03 mm, measured at seat surface of clutch cover

- permissible face tolerance 0.04 mm

Removing and installing cylinder head



Note:

The entire coolant must be replaced when fitting on a new cylinder head.

1 - Cylinder head cover

2 - Nut
- 3 Nm

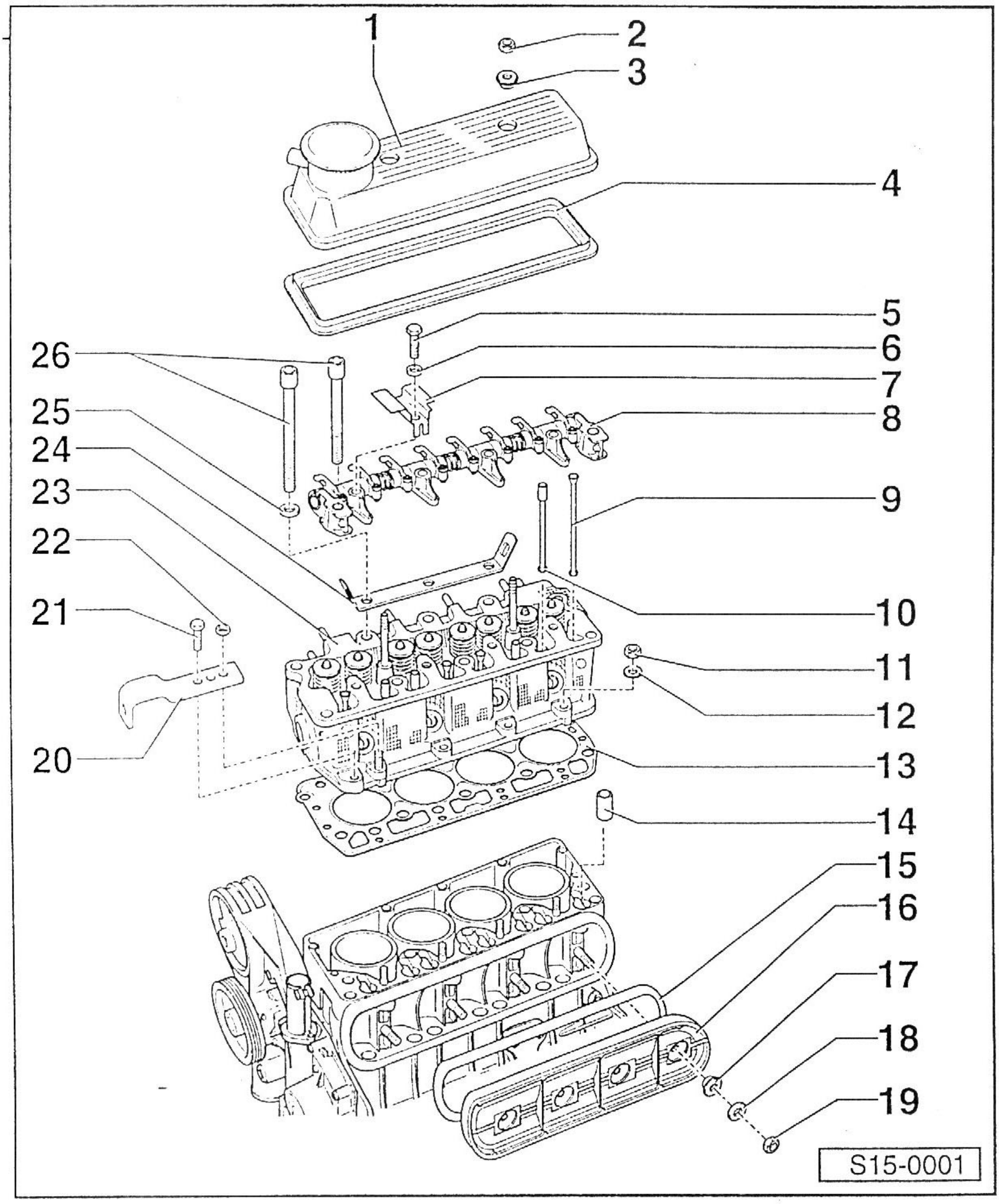
3 - Rubber seal
- Pay attention to fitting location

4 - Gasket
- Replace if damaged

5 - Hexagon bolt
- 30 Nm

6 - Washer

7 - Oil deflector



8 - Rocker arm shaft
- Detaching and attaching rocker arms ⇒ page 15-8
- Adjusting valves ⇒ page 15-6, Checking, adjusting valve clearance

9 - Steel push rod (exhaust)

10 - Aluminium push rod (inlet)
- With press-fitted steel inserts

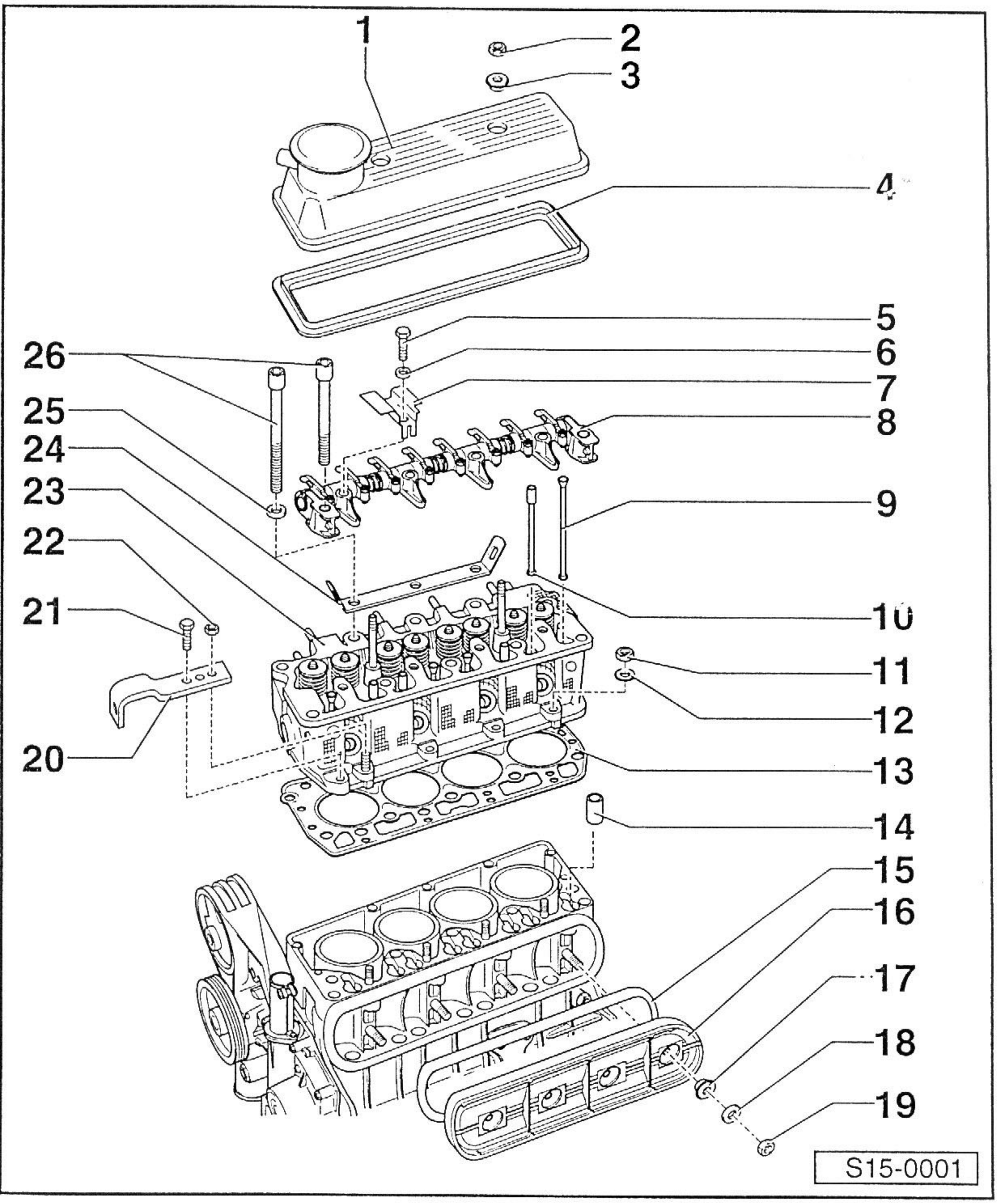
11 - Hexagon nut
- 26 Nm
- Tighten after tightening the cylinder head bolts

12 - Washer

13 - Cylinder head gasket
- Replace
- Pay attention to fitting location; oil drilling must not be covered over
- Replace the entire coolant after fitting on new gasket

14 - Valve tappet
- Examine for wear ⇒ page 15-6, Table of valve tappet guides

15 - Gasket
- Replace if damaged
- Fitting location ⇒ Fig. 3



16 - Push rod cover
- Recess faces down

17 - Rubber seal
- Pay attention to fitting location

18 - Washer

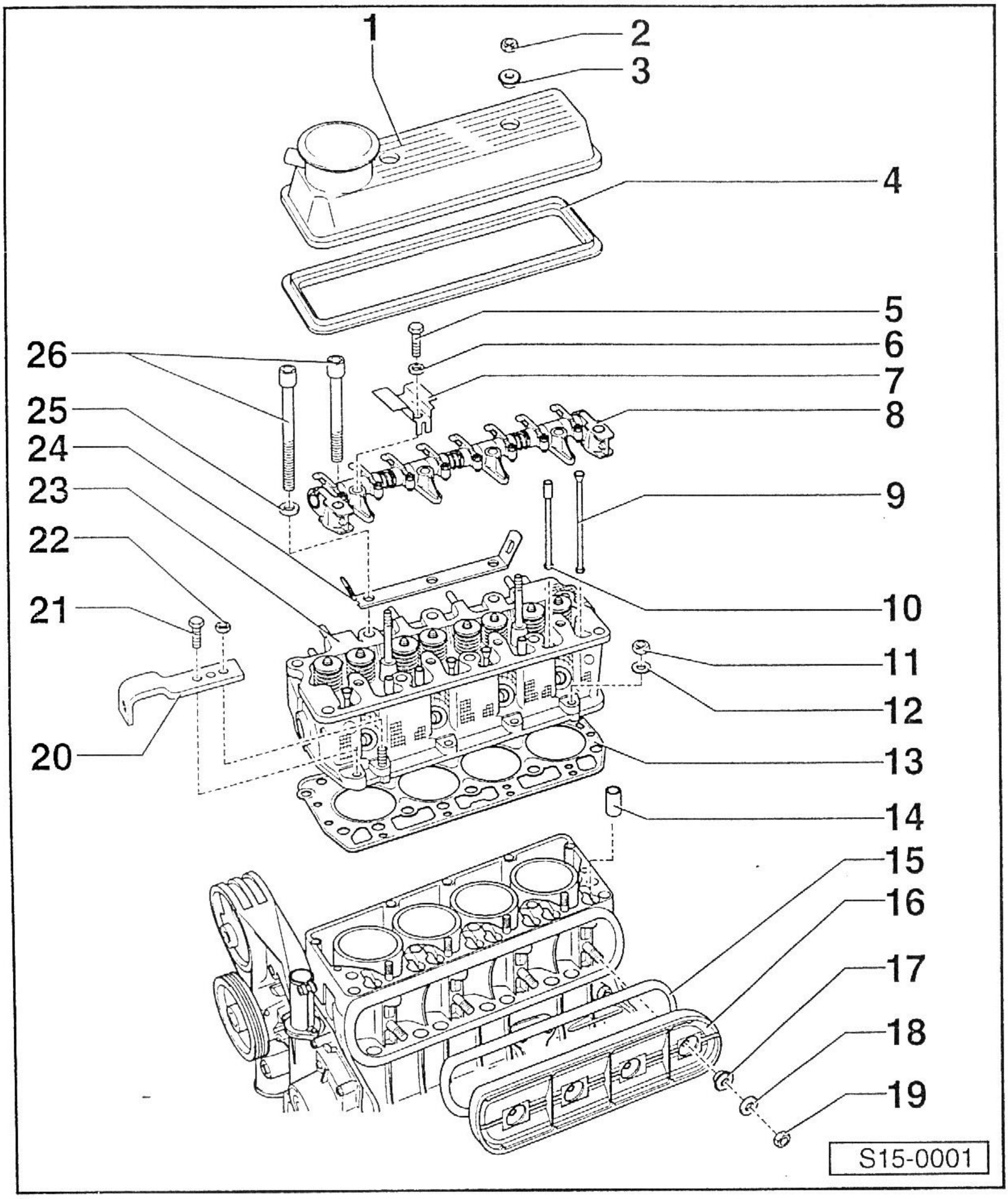
19 - Hexagon nut
- 4 Nm

20 - Bracket

21 - Hexagon bolt
- Screw in with Loctite 270
- 26 Nm
- Tighten after tightening cylinder head bolts

22 - Hexagon nut
- Self-locking
- 24 Nm
- Tighten after tightening cylinder head bolts

23 - Cylinder head
- Replace the entire coolant after fitting on new cylinder head
- Removing and installing valves ⇒ page 15-11
- Grinding in valve seats ⇒ page 15-12

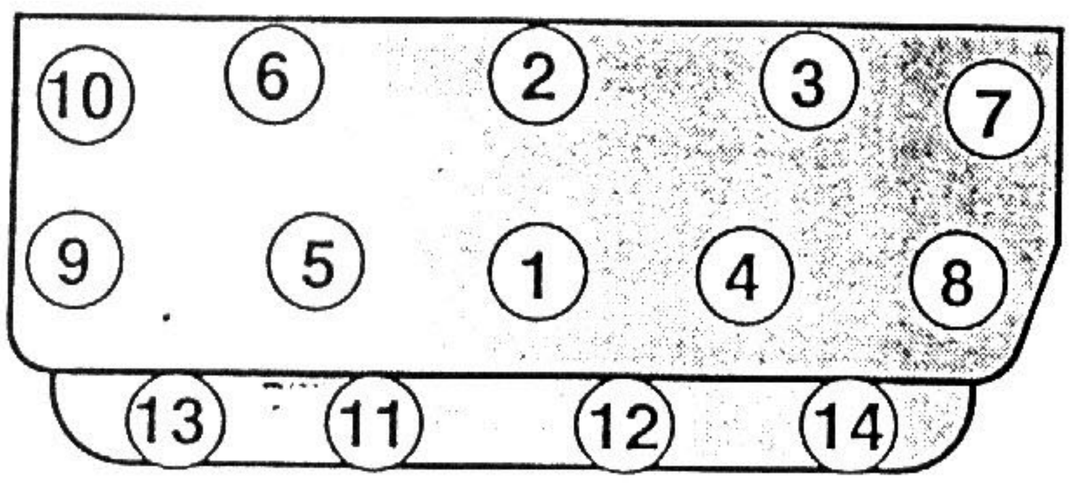


24 - Bracket

25 - Washer

26 - Cylinder head bolt

- ♦ Can be re-used
- ♦ Slacken in reverse order, Fig. 2
- ♦ Order for tightening ⇒ Fig. 2
- ♦ Pay attention to different bolt length ⇒ Fig. 1
- ♦ Moisten thread with oil before inserting



◄ **Fig. 1 Length of cylinder head bolts and fitting location**

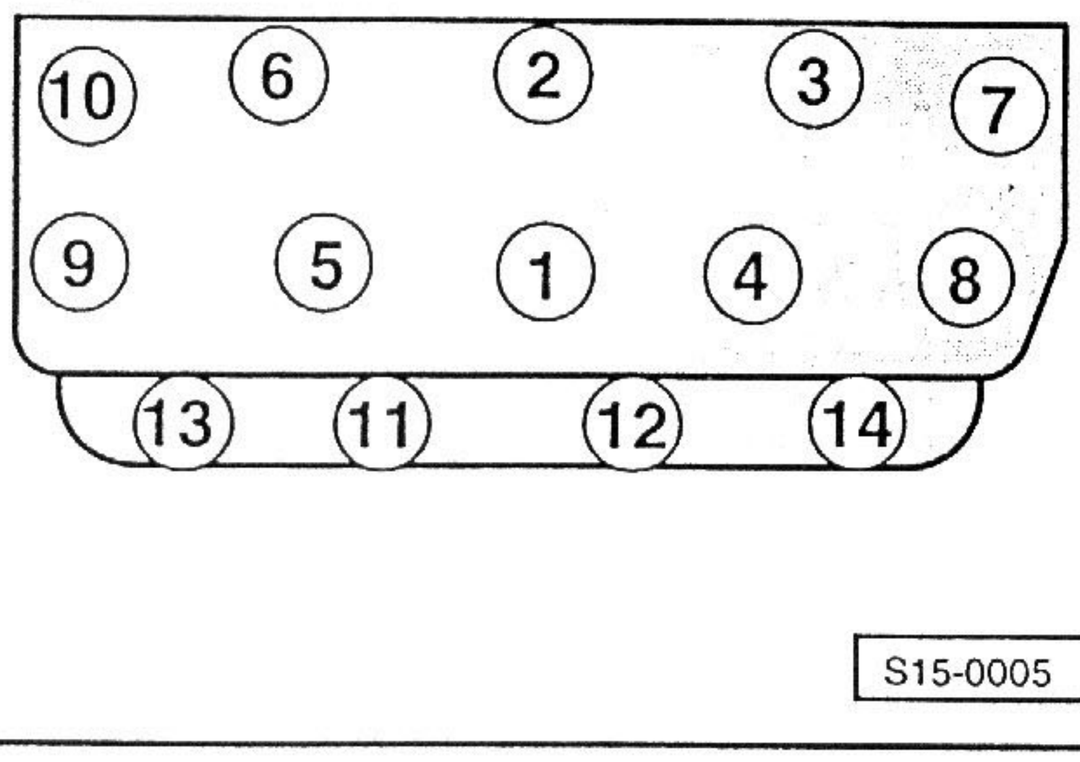
1...7 = 168 mm

8...9 = 183.5 mm

10 = 132.0 mm

Note:

Insert cylinder head bolts 8 and 9 without washer.



◄ **Fig. 2 Tightening diagram of cylinder head bolts**

- Tighten cylinder head in three stages in the tightening order shown.
- 1. Tighten initially with torque wrench:

  Stage I = 20-3 Nm

- 2. Torque further with rigid wrench:

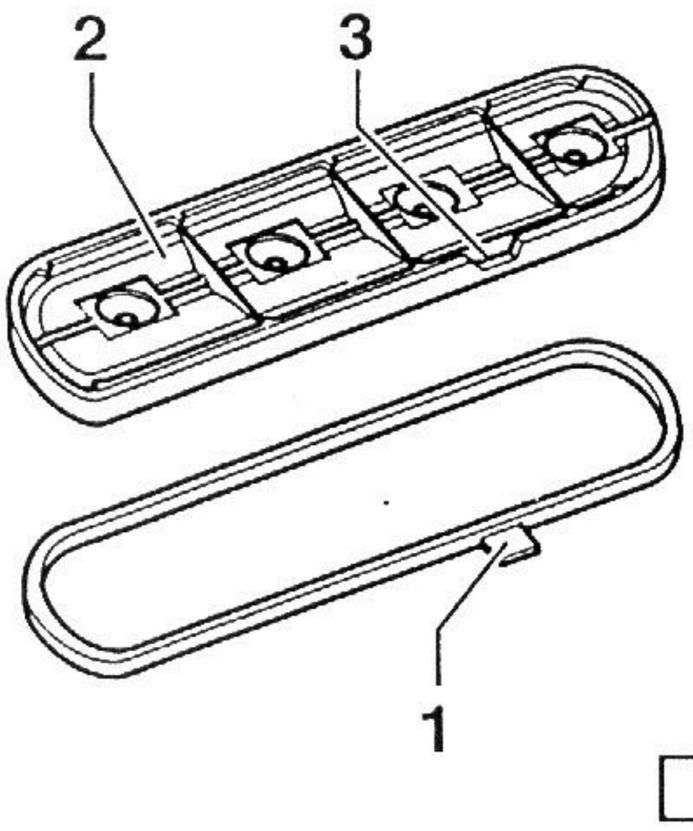
  Stage II = 1/4 turn (90° ± 5°)

  Stage III = 1/4 turn (90° ± 5°)

The total torquing angle of stages II and III should be 180° ± 5°.

Note:

It is not necessary to re-tighten the cylinder head bolts after performing repairs to the engine.



◄ **Fig. 3 Fitting location of gasket in push rod cover**

Insert the gasket into the push rod cover -2- so that the shoulder -1- is positioned on the side of the recess -3-.

Valve tappet guides

-	Standard mm	Oversize mm	Tolerance mm
Ø of valve tappet	21	-	-0.007...0.020
	-	21.2	-0.007...-0.020
Ø in engine block	21	-	+0.021...-0.000
	-	21.2	+0.021...-0.000

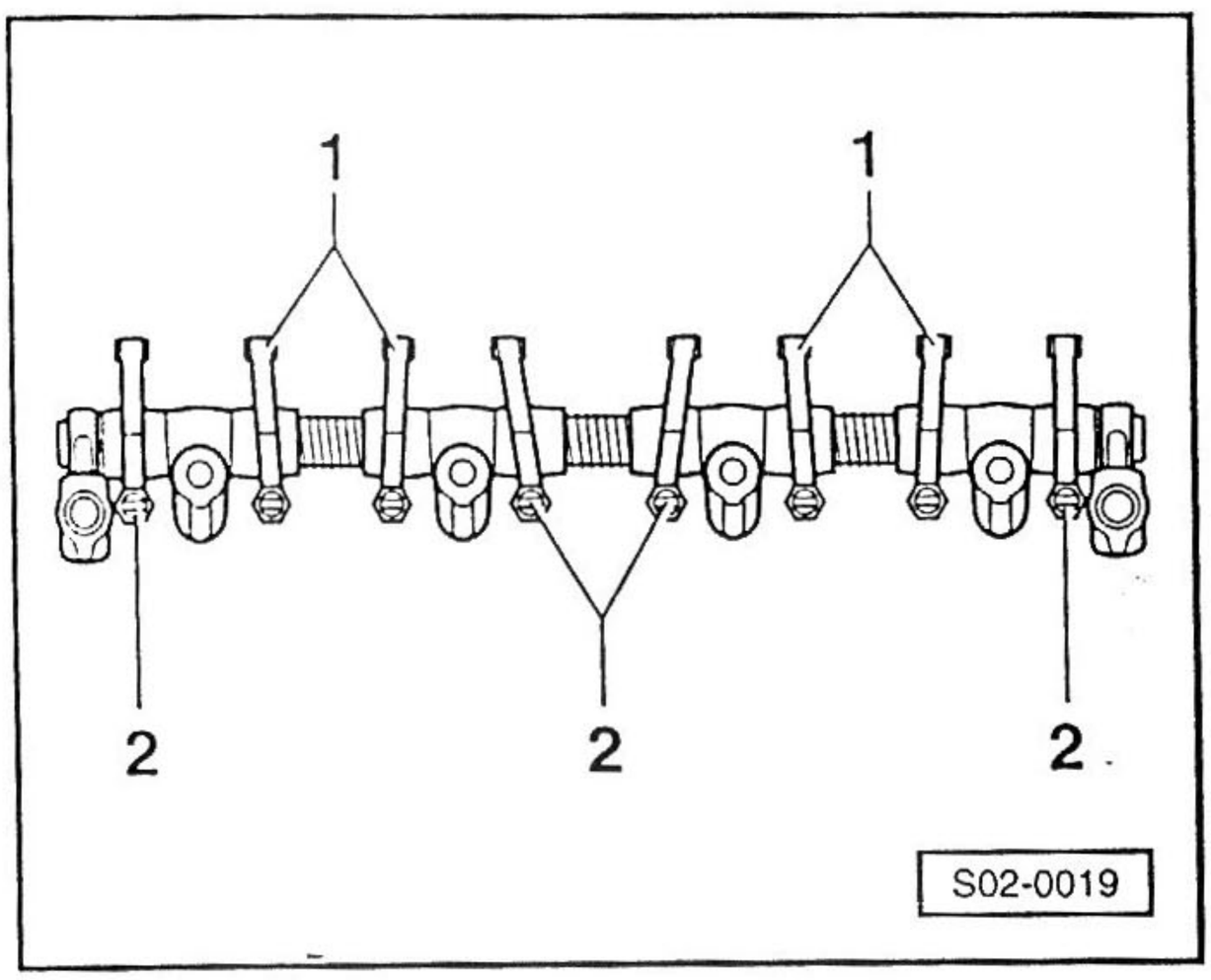
Examining and setting valve clearance

Special tools, testers and aids required

- ♦ Feeler gauge 0.20 mm and 0.25 mm

- Perform setting of valve clearance at room temperature and engine cold (about 20 °C).

- Remove cylinder head cover.



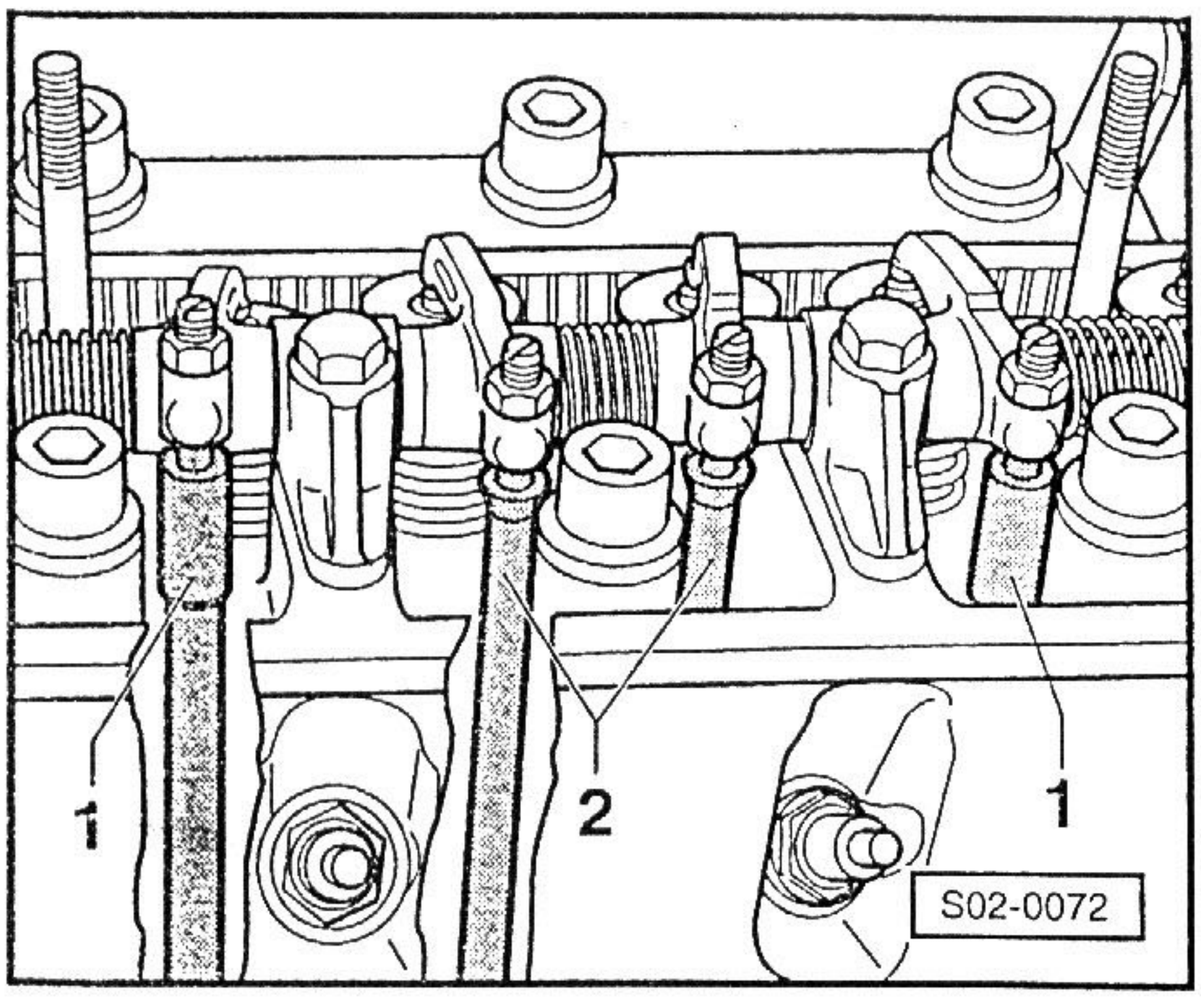
- The illustration shows the arrangement of the rocker arms of the valves in the cylinder head.

  1 - Rocker arm of inlet valve
  2 - Rocker arm of exhaust valve

- Turn the flywheel to position engine at valve overlap of a cylinder
  ⇒ Table below

Setting order for valves:

Setting order	Valve overlap
Cylinder	Cylinder
1	4
3	2
4	1
2	3



◄ - Illustration shows the different versions of push rods.

1 - Aluminium push rods (inlet)

2 - Steel push rods (exhaust)

The aluminium push rods can be recognised from the press-fitted steel inserts on the aluminium tappet rod part.

Length tolerance of aluminium push rods

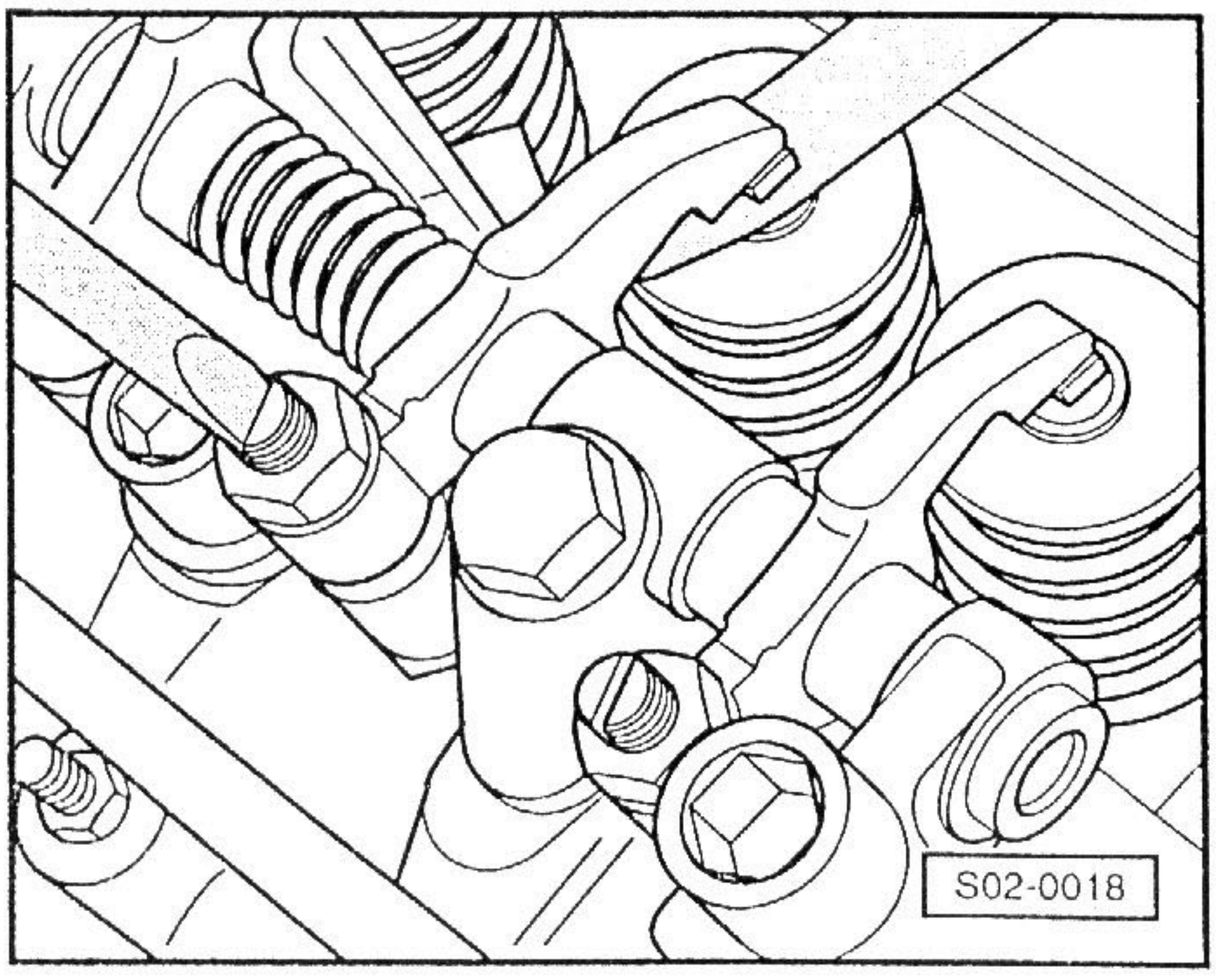
Identification	Year of manufacture	Dimension/ tolerance in mm
	➤ 02.96	209 + 0.9
A	03.96 ➤	209 + 0.5
B	03.96 ➤	209.5 - 0.5

Note:

Only push rods of the same length tolerance should be installed in an engine.

Valve clearance settings

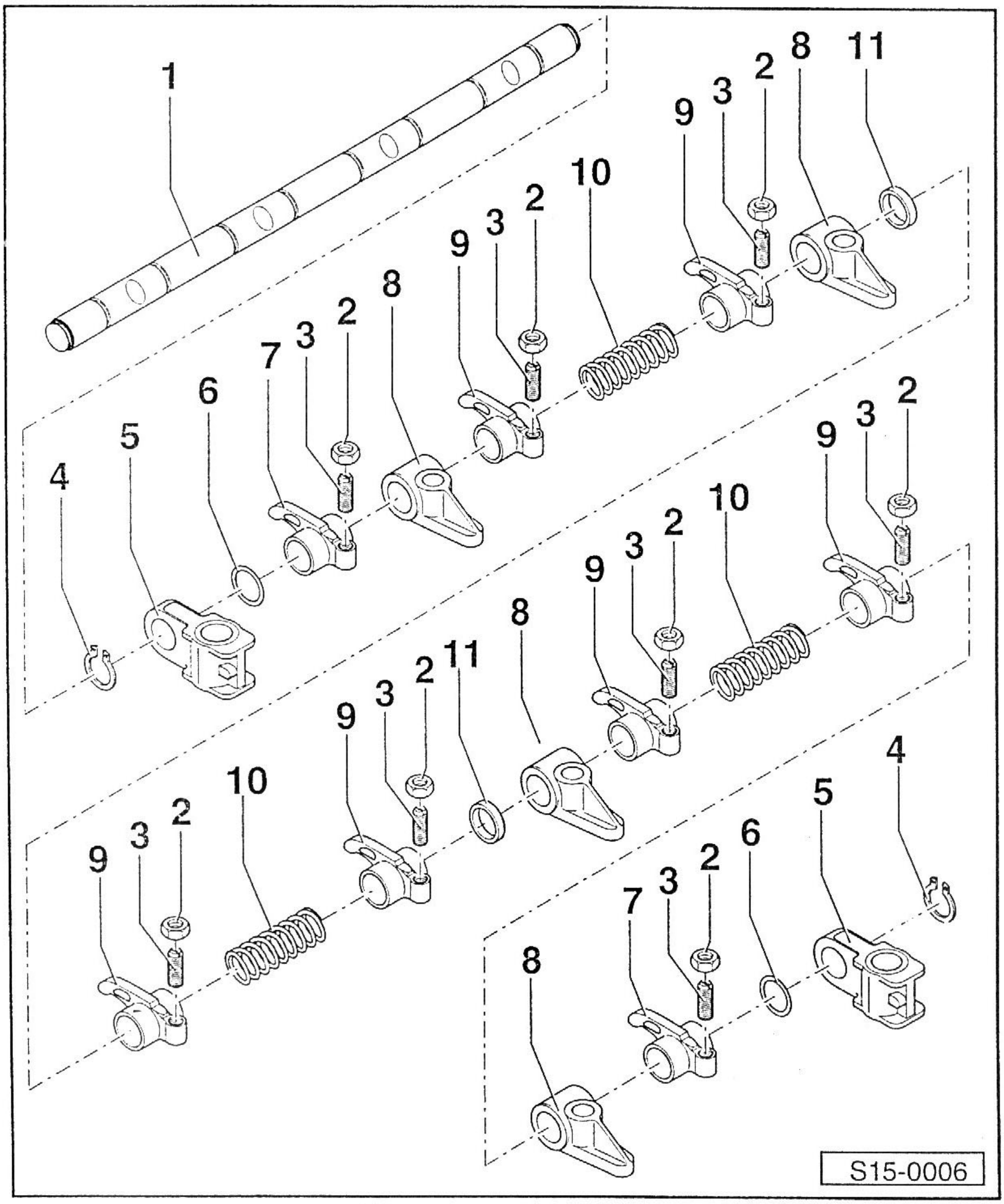
	Inlet valve mm	Exhaust valve mm
Steel push rods	-	0.20
Aluminium push rods	0.25	-
If ambient temperature constantly lower than -25°C	0.25	0.25



◄ - Check valve clearance between valve and rocker arm with a feeler gauge (valve is closed for the check); set to specification with a screwdriver and box wrench at adjusting screw, if necessary.

- Tighten locknut to 18 Nm after adjusting.

Removing and installing rocker arms



1 - Rocker arm shaft

2 - Hexagon nut
- ♦ 18 Nm

3 - Valve adjusting screw

4 - Circlip

5 - Outer rocker arm bracket

6 - Spring lock washer

7 - **Straight rocker arm**
- ♦ Fitting location ⇒ Fig., page 15-6

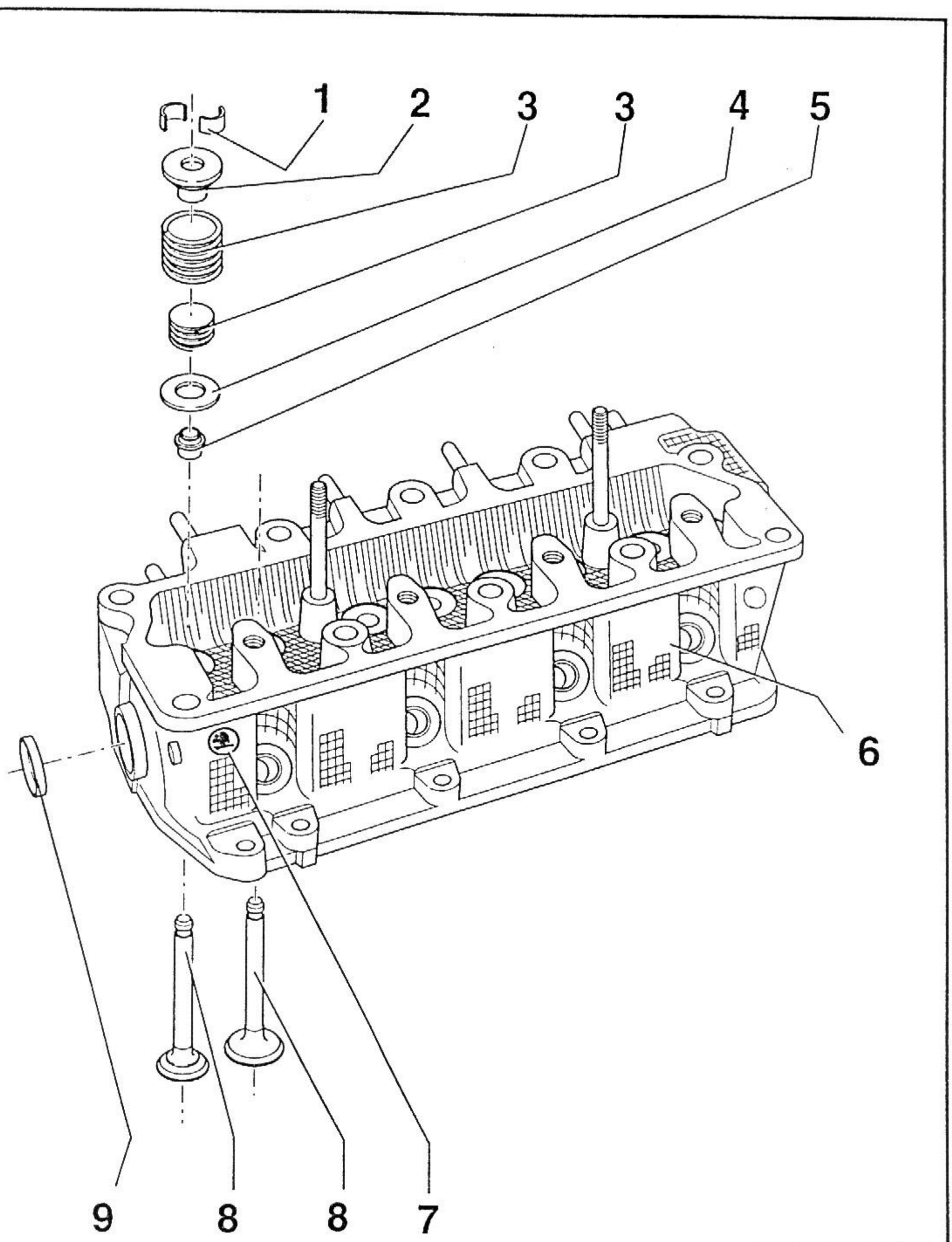
8 - **Rocker arm bracket**
- ♦ Fitting location ⇒ Fig., page 15-6

9 - **Angled rocker arm (angled 3° each to right or left)**
- ♦ Fitting location ⇒ Fig., page 15-6

10 - Spring

11 - Tensioning ring

Servicing cylinder head



1 - Valve collets
- have to be correctly inserted into groove of valve

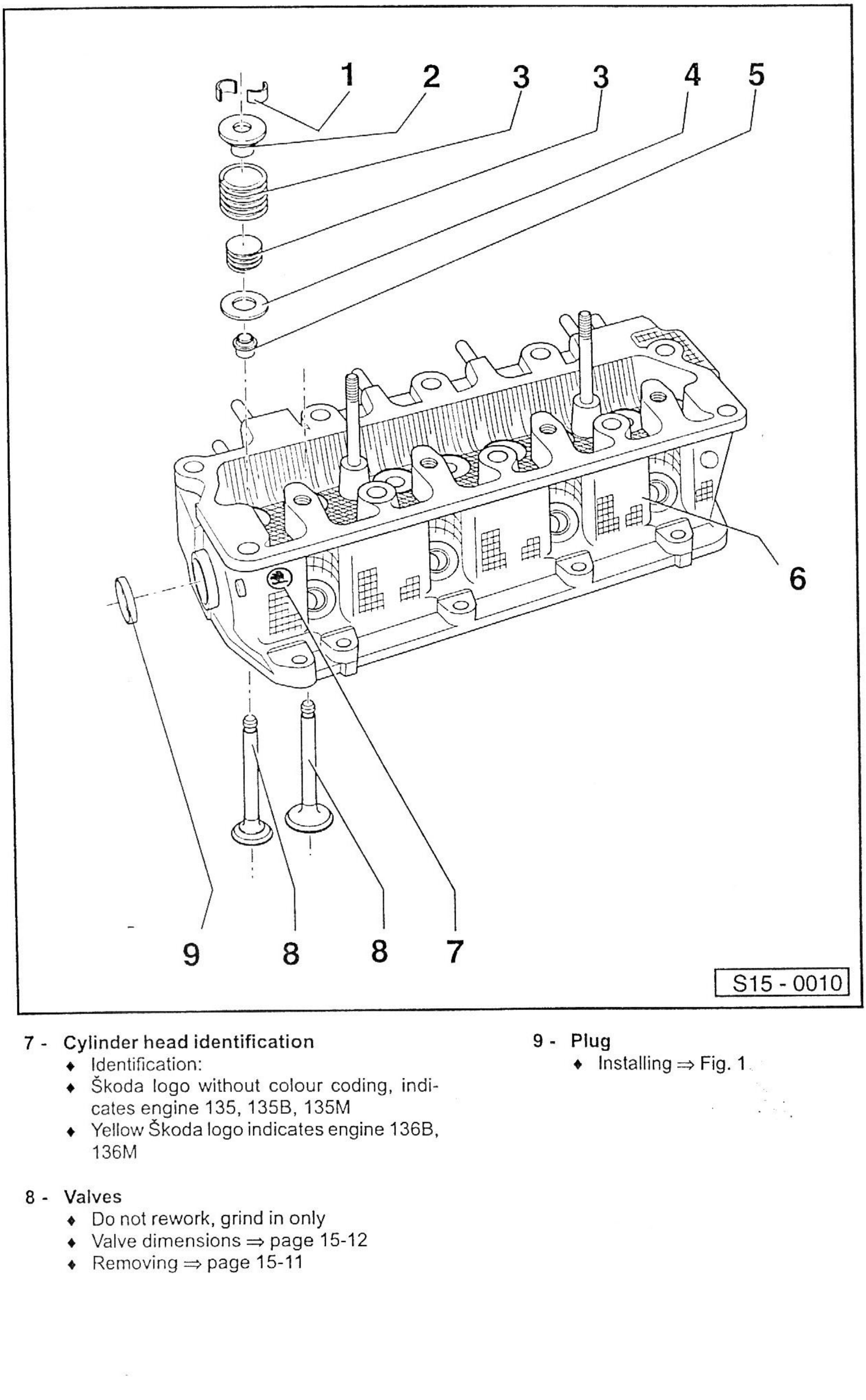
2 - Valve spring retainer

3 - Valve springs
- Removing and installing ⇒ page 15-11, Removing and installing valves
- Only one spring on engine 135M
- Identification: the outer spring on engine 135, 135B, 135M has no marking
  Engine 136B, 136M - is marked in yellow

4 - Washer

5 - Valve stem seal
- Replacing ⇒ page 15-13

6 - Cylinder head
- Grinding in valves ⇒ page 15-12



7 - Cylinder head identification

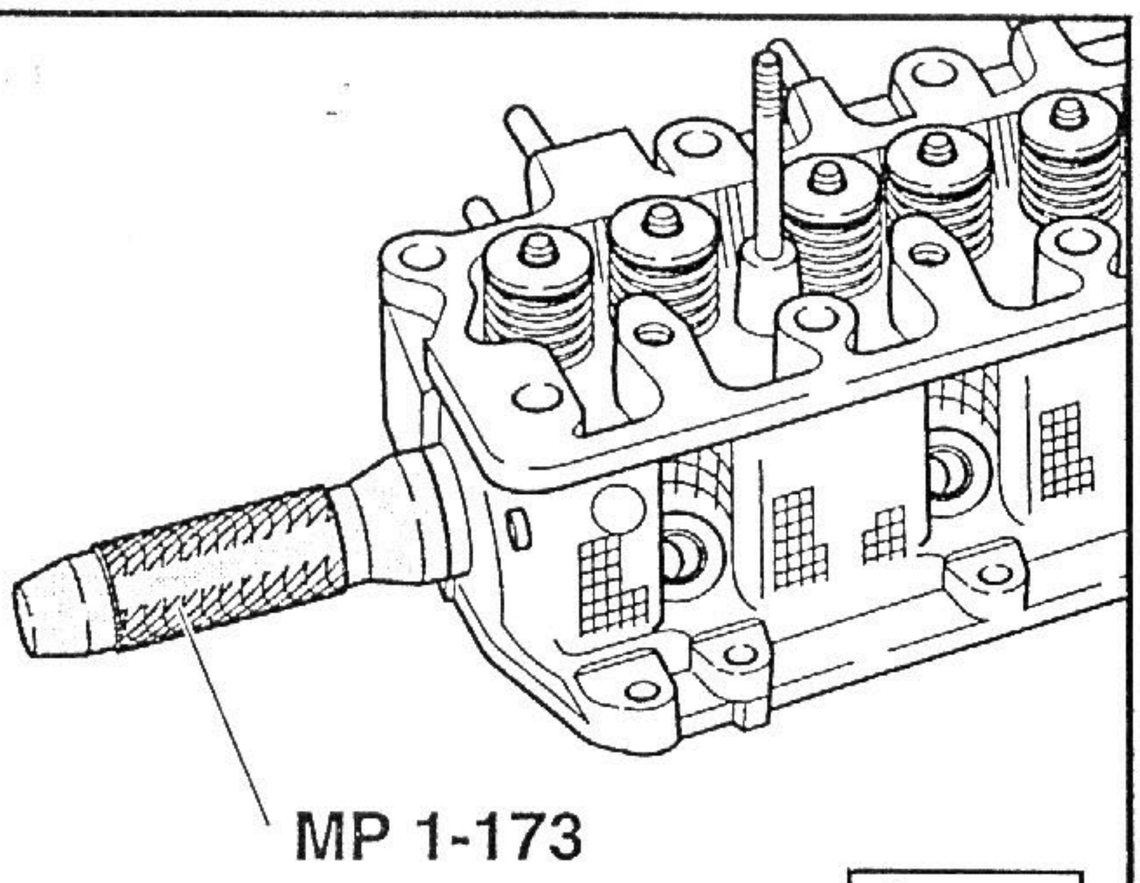
- ♦ Identification:
- ♦ Škoda logo without colour coding, indicates engine 135, 135B, 135M
- ♦ Yellow Škoda logo indicates engine 136B, 136M

8 - Valves

- ♦ Do not rework, grind in only
- ♦ Valve dimensions ⇒ page 15-12
- ♦ Removing ⇒ page 15-11

9 - Plug

- ♦ Installing ⇒ Fig. 1



◄ **Fig. 1 Inserting plug into cylinder head**

Special tools, testers and aids required

- ♦ Inserting drift Ø 20 mm MP 1-171
- ♦ Inserting drift Ø 30 mm MP 1-173
- ♦ Loctite 270

- Coat outer circumference of plug with Loctite 270.
- Use a suitable drift to insert plug.

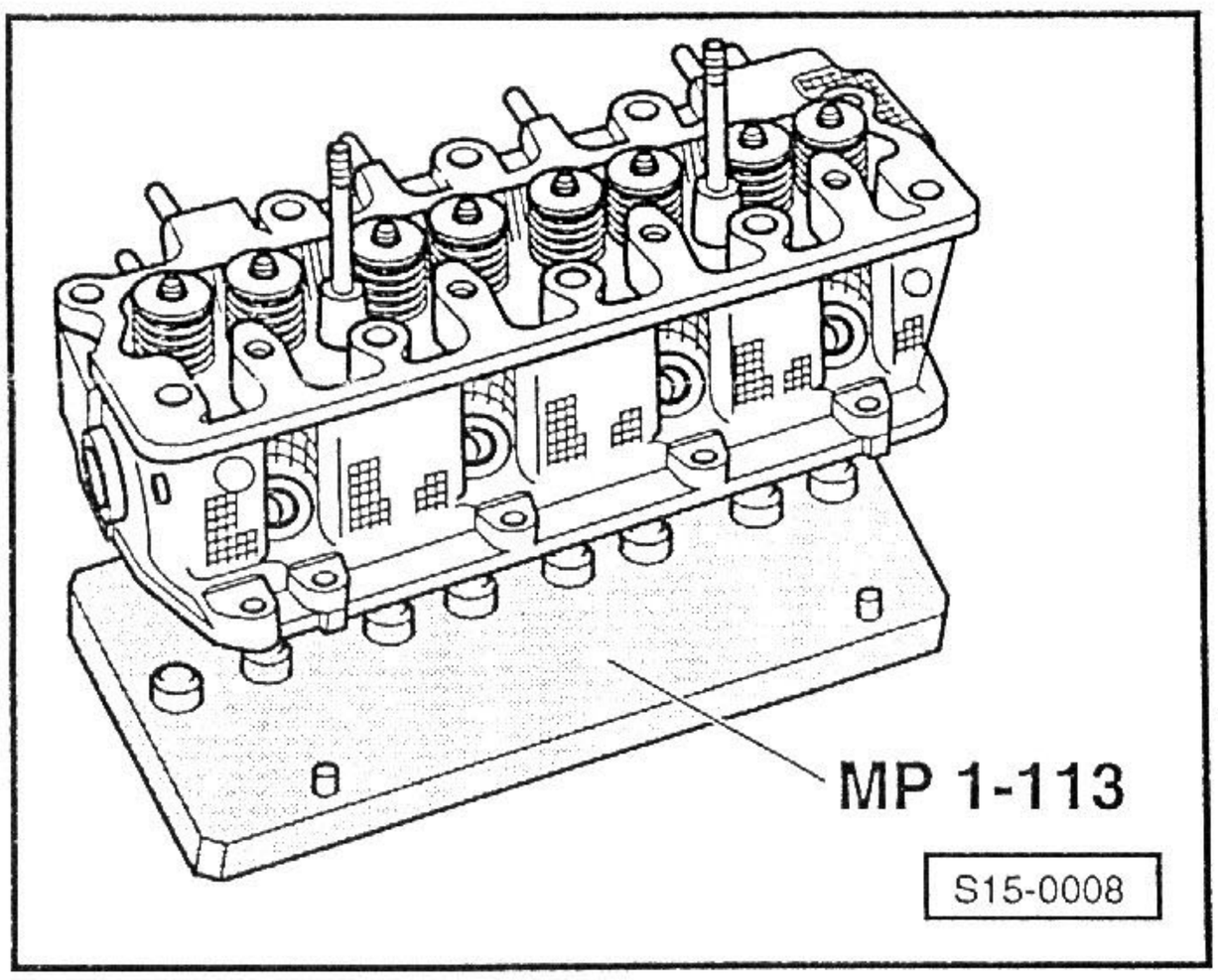
Removing and installing valves

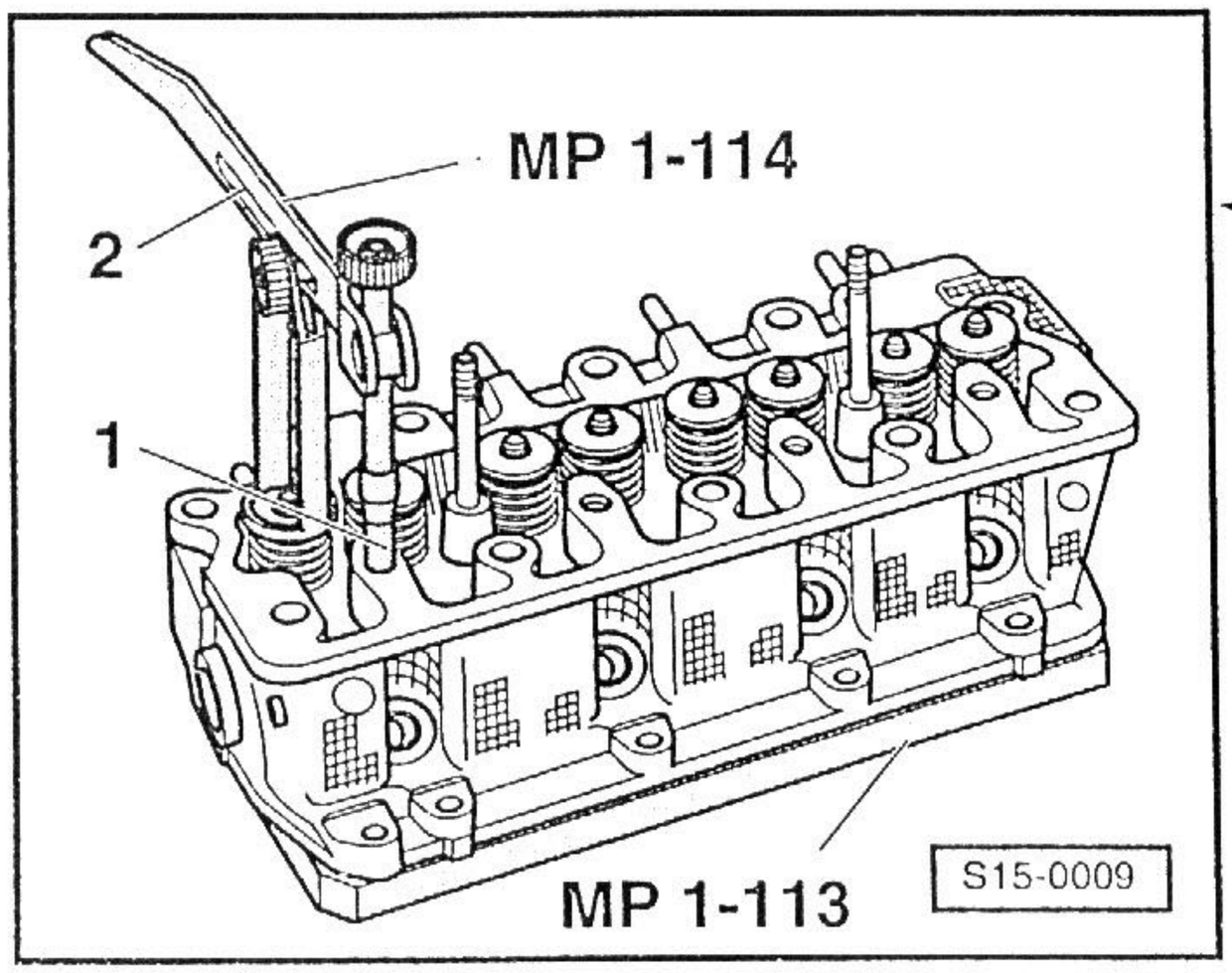
Removing

Special tools, testers and aids required

- ♦ Valve supporting plate MP 1-113
- ♦ Valve spring assembly lever MP 1-114
- ♦ M8x40 threaded adapter

◄ - Mount cylinder head on valve supporting plate MP 1-113.





◄ - Attach valve spring assembly lever MP 1-114 with threaded connector -1- to the cylinder head.

- Press down assembly lever -2-.
- Take out collets.

Note:

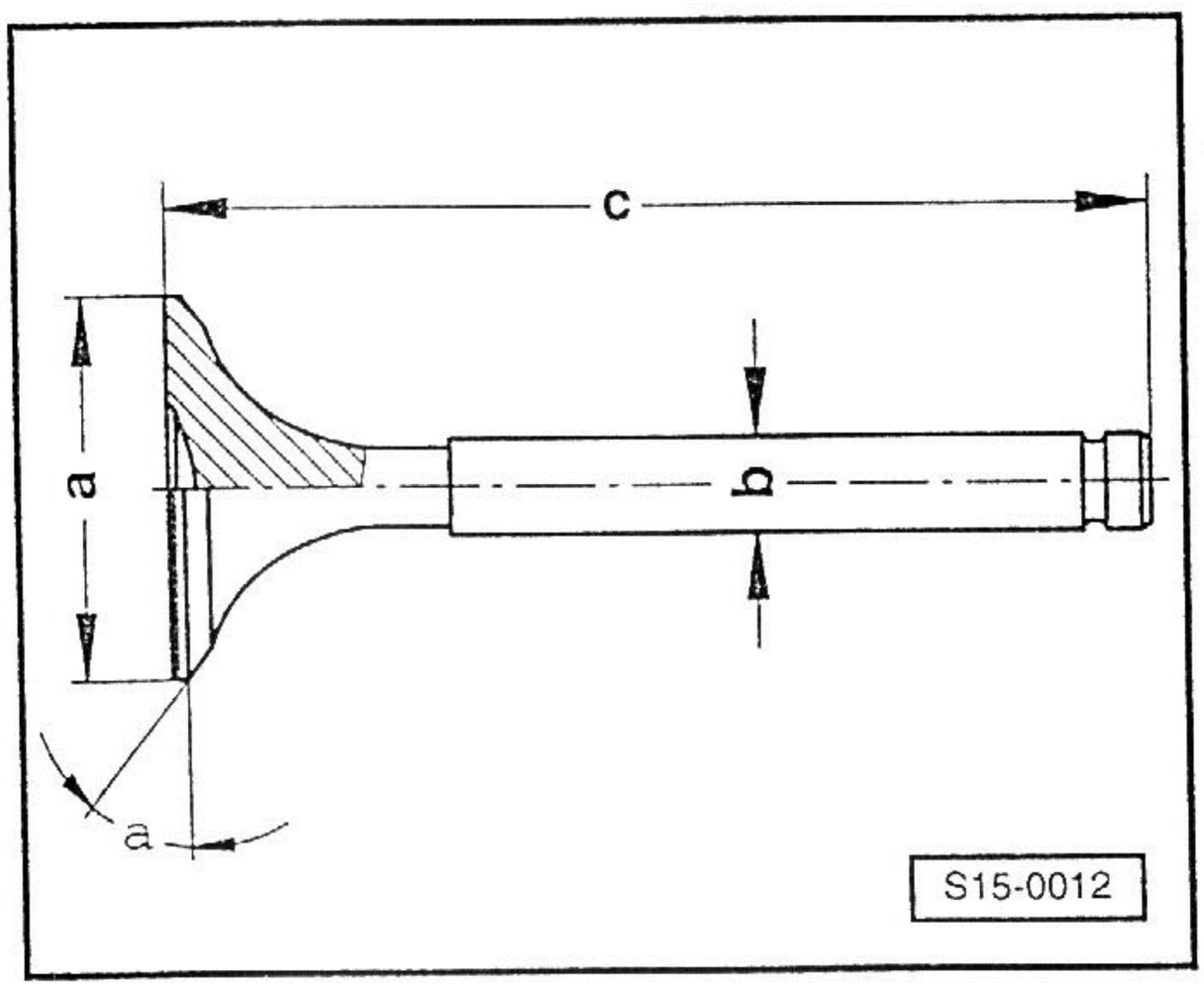
If collets are tight, they can be slackened by striking assembly lever lightly with a hammer.

- Pull out valves.

Valve springs	Wire gauge in mm	Free length in mm	Average diameter in mm	Force in N at length of 30 mm
Outer spring 135B	3.75	45.85	26.75	299 .. 358
Inner spring 135B, 136B, 136M	2.50	43.60	18.50	108 ... 127
Outer spring 136B, 136M	3.75	46.50	26.75	426.5 2)
Spring 135M 1)	3.75	48.85	26.75	333.5 ± 30

1) only one spring on engine 135M

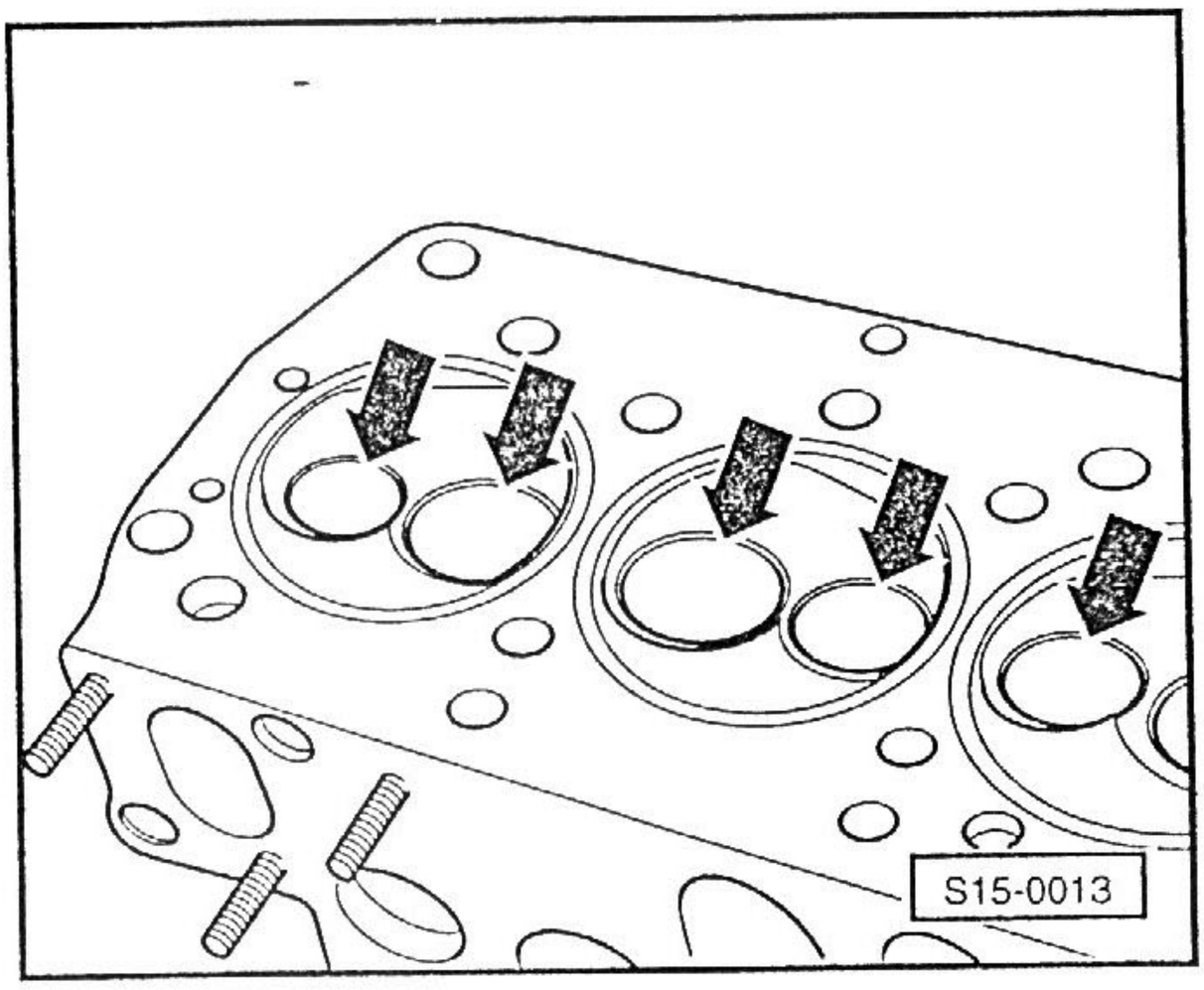
2) measured at length of 27.2 mm



◄ Valve dimensions

Note:
Valves must not be reworked. Only grinding in is permissible.

Dimension	Inlet valve		Exhaust valve	
	Stan-dard	Over-size	Stan-dard	Over-size
Ø -a- mm	34	34	30	30
Ø -b- mm	8.00	8.25	8.00	8.25
-c- mm	101	101	101	101
α ∠°	45	45	45	45



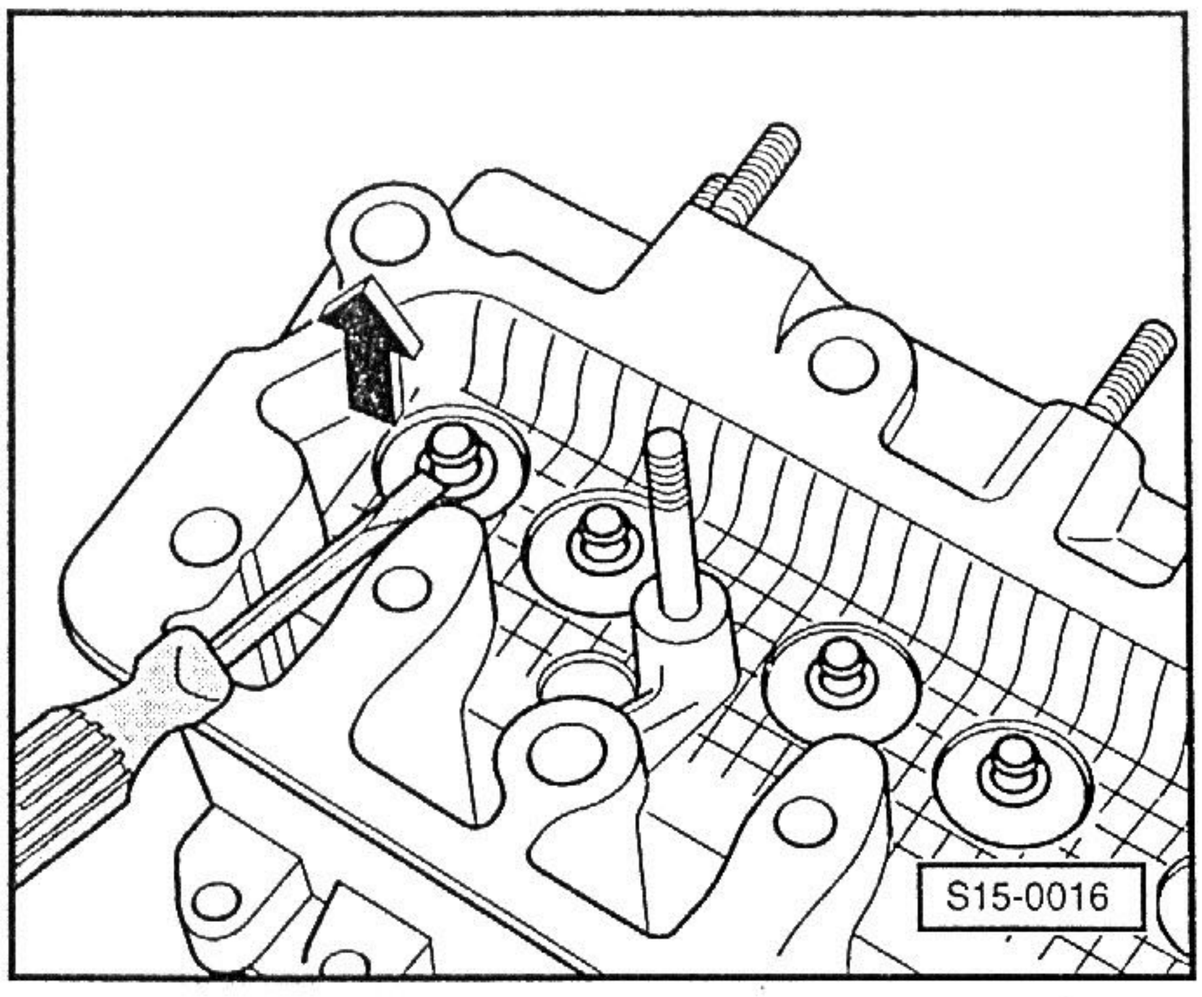
Grinding in valve seats

Note:

On engines with leaking valves, it is not sufficient to only grind in the valve seats. It is also necessary to inspect the valve guides for wear, particularly on engines with a high mileage.

◄ - Grind in valve seats sufficiently with grinding paste and valve until a proper honing pattern is achieved over the entire circumference -arrows-

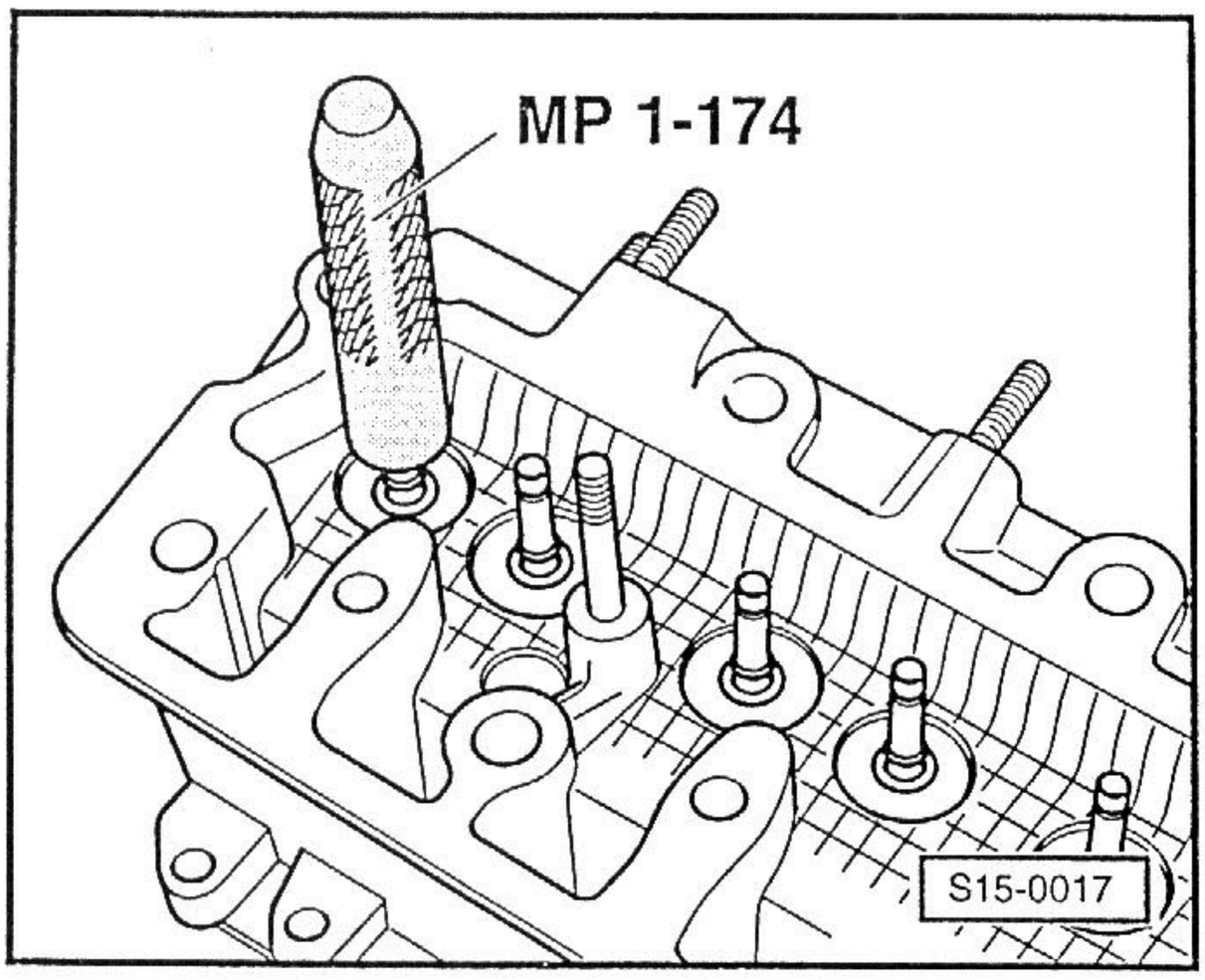
Replacing valve stem seals



Special tools, testers and aids required

- Tool for pressing on valve stem seal MP 1-174
- Valve supporting plate MP 1-113

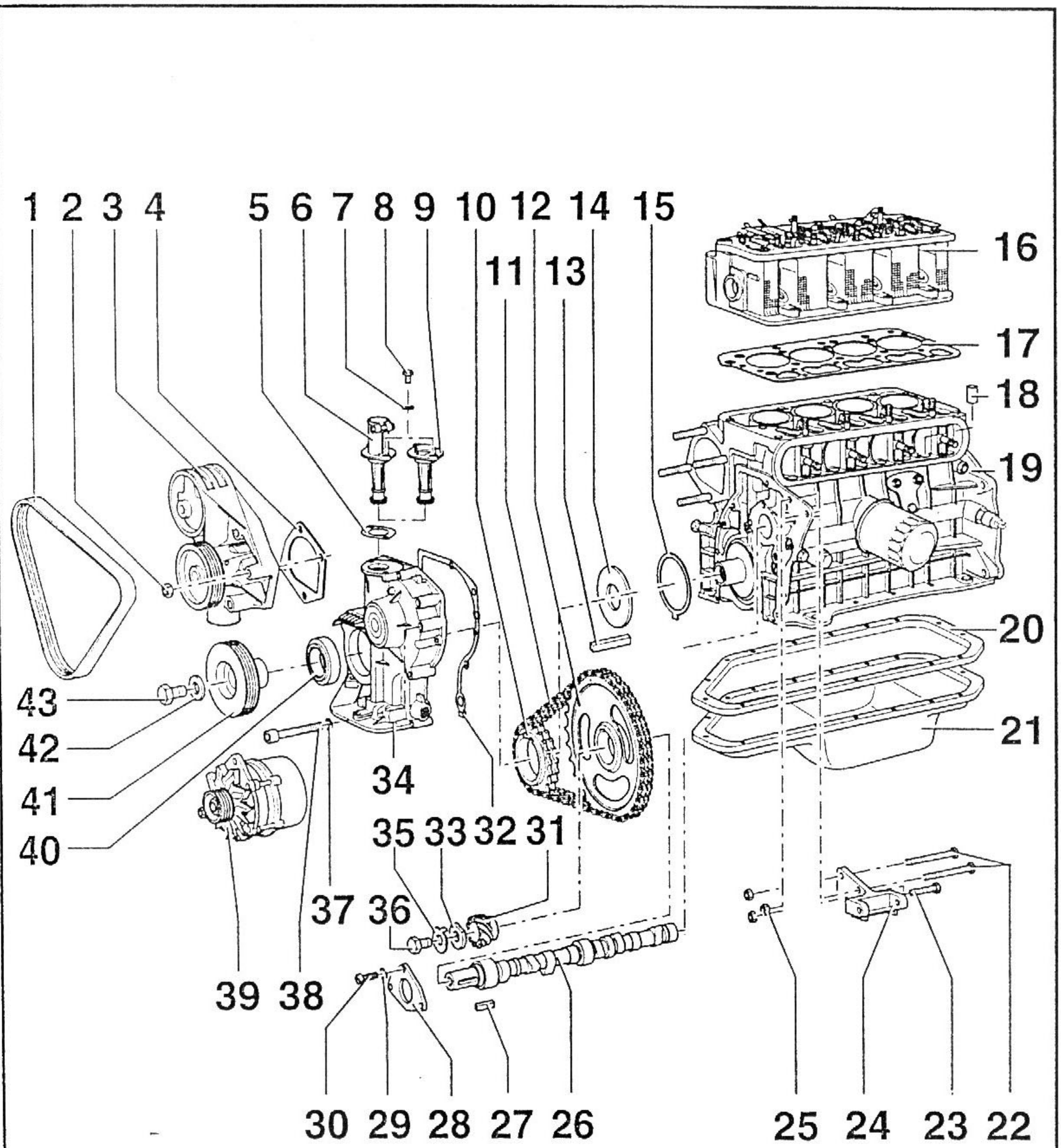
◀ - Carefully lever off valve stem seal.



- Insert valve into the guide.

◀ - Oil valve stem seal, insert into the fitting tool MP 1-174 with the coil spring at the front and carefully press onto the valve guide.

Servicing valve gear



1 - Ribbed V-belt for alternator
- Mark direction of running before removing
- Inspecting, tensioning
  ⇒ Inspection and Maintenance; Inspecting condition and tension of ribbed V-belt, tensioning if necessary

2 - Hexagon nut, 20 Nm
- self-locking

3 - Coolant pump

4 - Gasket
- replace

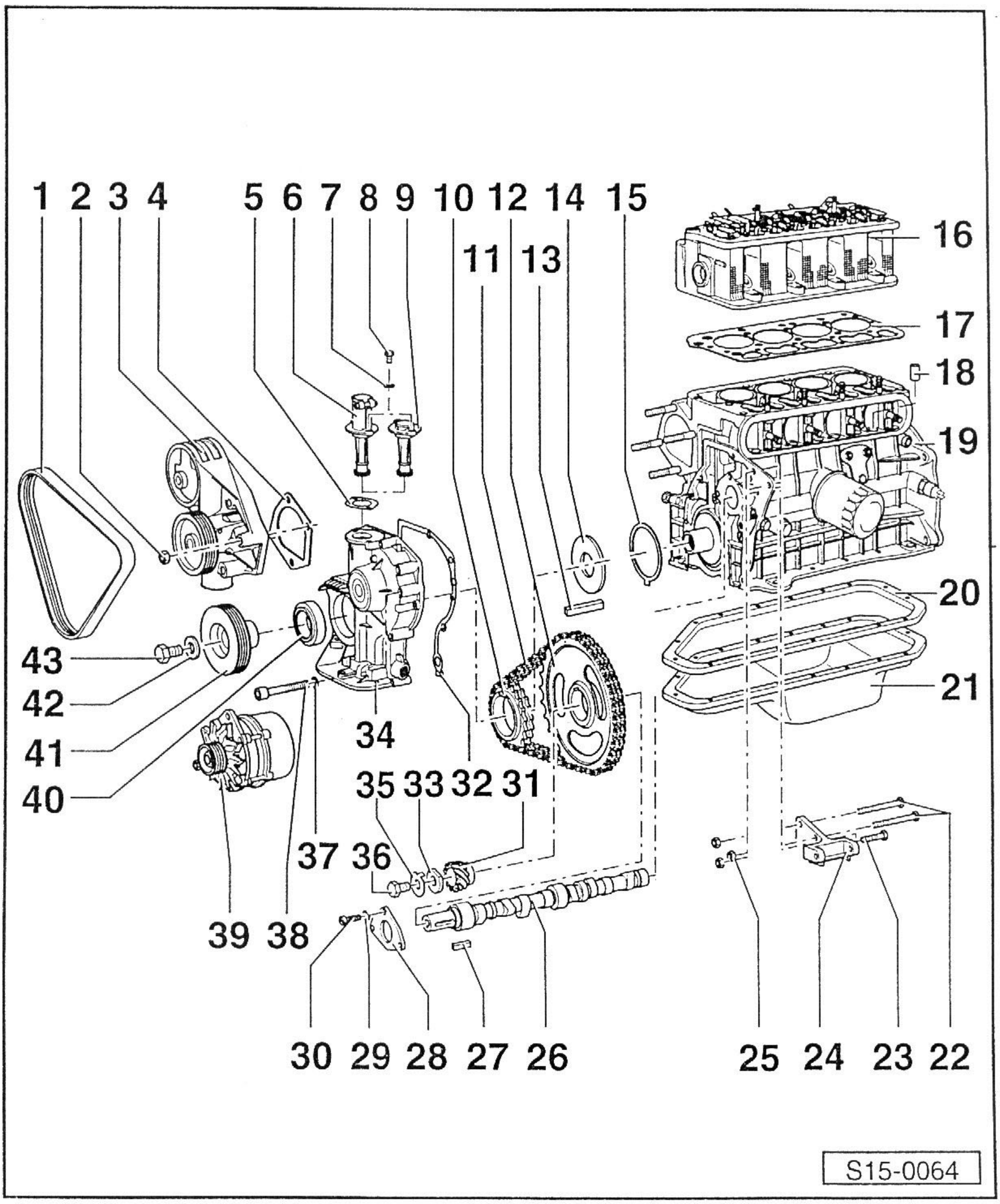
5 - Gasket
- replace

6 - Distributor bracket
- Installing ⇒ page 15-18

7 - Washer

8 - 8 Nm

9 - Plug
- Only on engine 135M, 136M
- Installing ⇒ page 15-18



10 - Crankshaft timing gear
- Removing and installing ⇒ page 15-20

11 - Timing chain
- Removing and installing ⇒ page 15-20
- Timing ⇒ page 00-2, Engine features

12 - Camshaft timing gear
- Removing and installing ⇒ page 15-20

13 - Parallel key

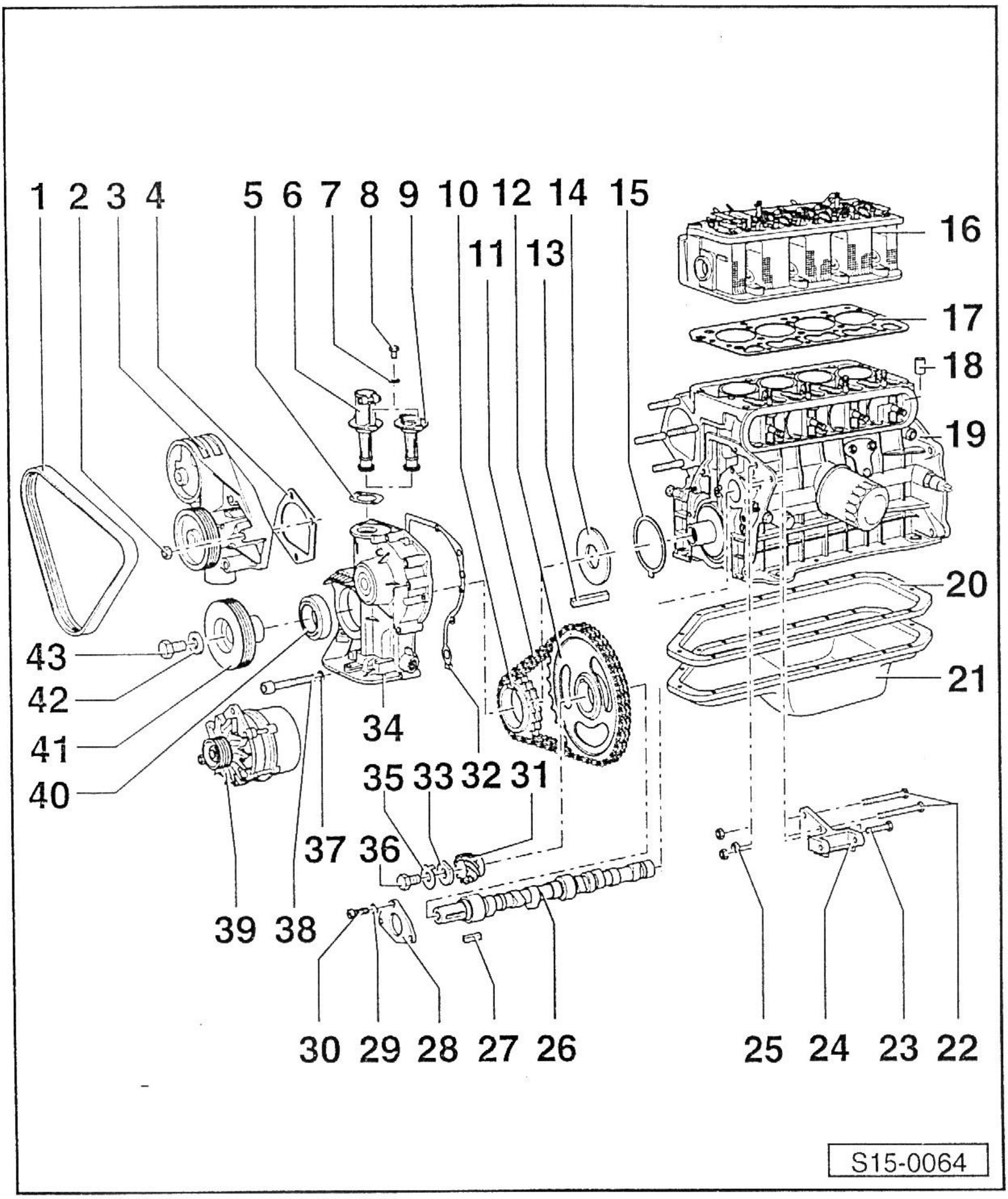
14 - Supporting ring
- Inner chamfer faces towards cylinder block

15 - Guide ring
- Lubricating grooves face out
- Pay attention to fixing element ⇒ page 15-20

16 - Cylinder head
- Removing and installing ⇒ page 15-1

17 - Cylinder head gasket
- Replacing ⇒ page 15-2

18 - Valve tappet
- Inspecting for wear page 15-6, Table of valve tappet guides



19 - Engine block

20 - Gasket
- ♦ replace

21 - Oil sump
- ♦ Tightening diagram of bolts ⇒ page 17-5

22 - Hexagon bolt

23 - Hexagon bolt

24 - Alternator bracket

25 - **Hexagon nut, 25 Nm**
- ♦ self-locking

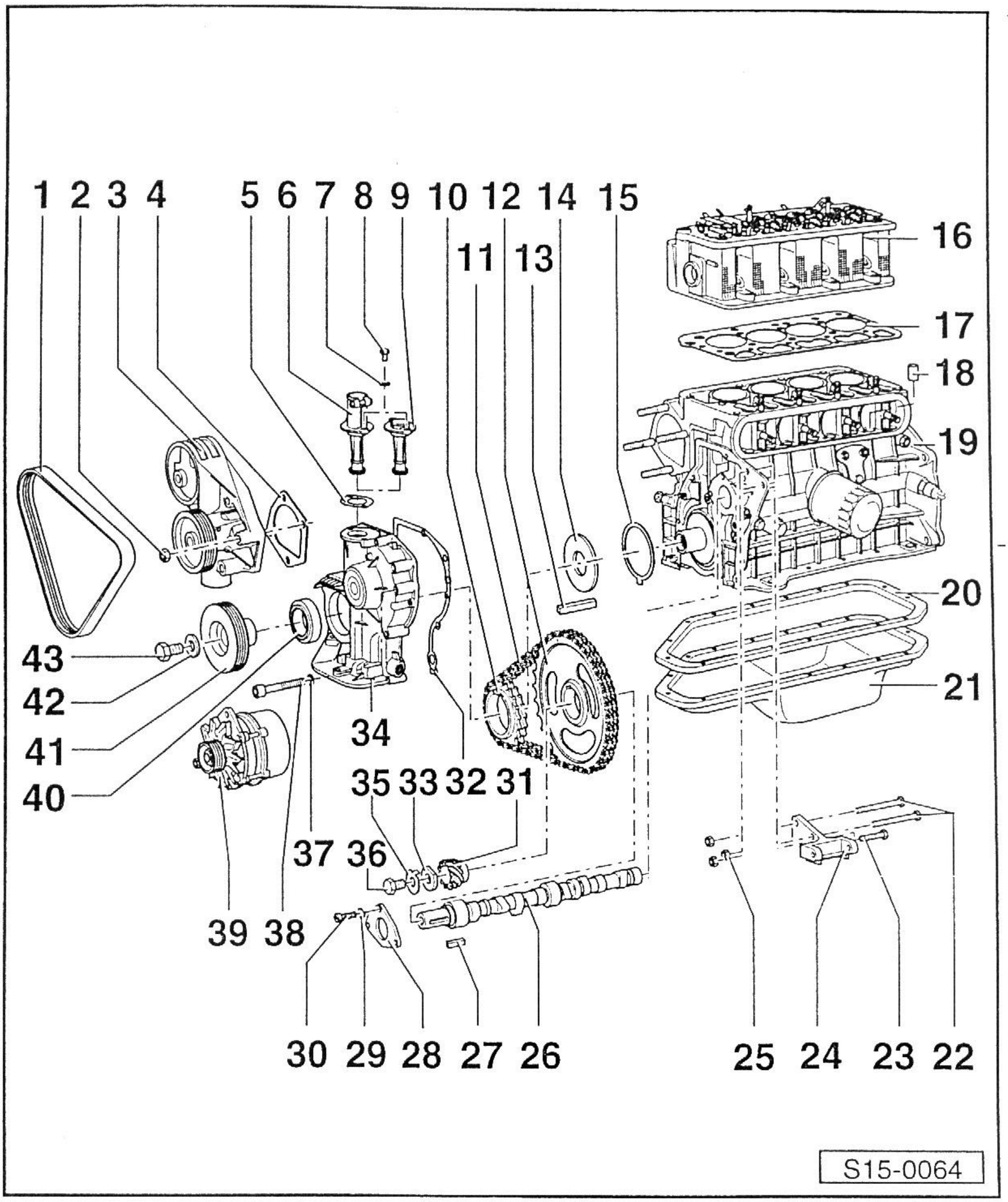
26 - **Camshaft**
- ♦ Removing and installing ⇒ page 15-22
- ♦ Identification ⇒ page 15-22

27 - **Parallel key**

28 - **Disc for camshaft**

29 - Washer

30 - 8 Nm



31 - **Helical gear**
- for distributor shaft drive
- Removing and installing ⇒ page 15-20

32 - **Gasket**
- replace

33 - **Washer**

34 - **Timing gear cover**
- Removing and installing ⇒ page 15-18

35 - **Locking washer**
- replace
- Securing ⇒ page 15-21

36 - **35 Nm**

37 - **Washer**

38 - **8 Nm**

39 - **Alternator**

40 - **Sealing ring**
- Lightly oil sealing lip of sealing ring
- Inserting ⇒ page 15-19

41 - **Belt pulley**

42 - **Washer**

43 - **120 Nm**

Removing and installing timing case cover, replacing seal

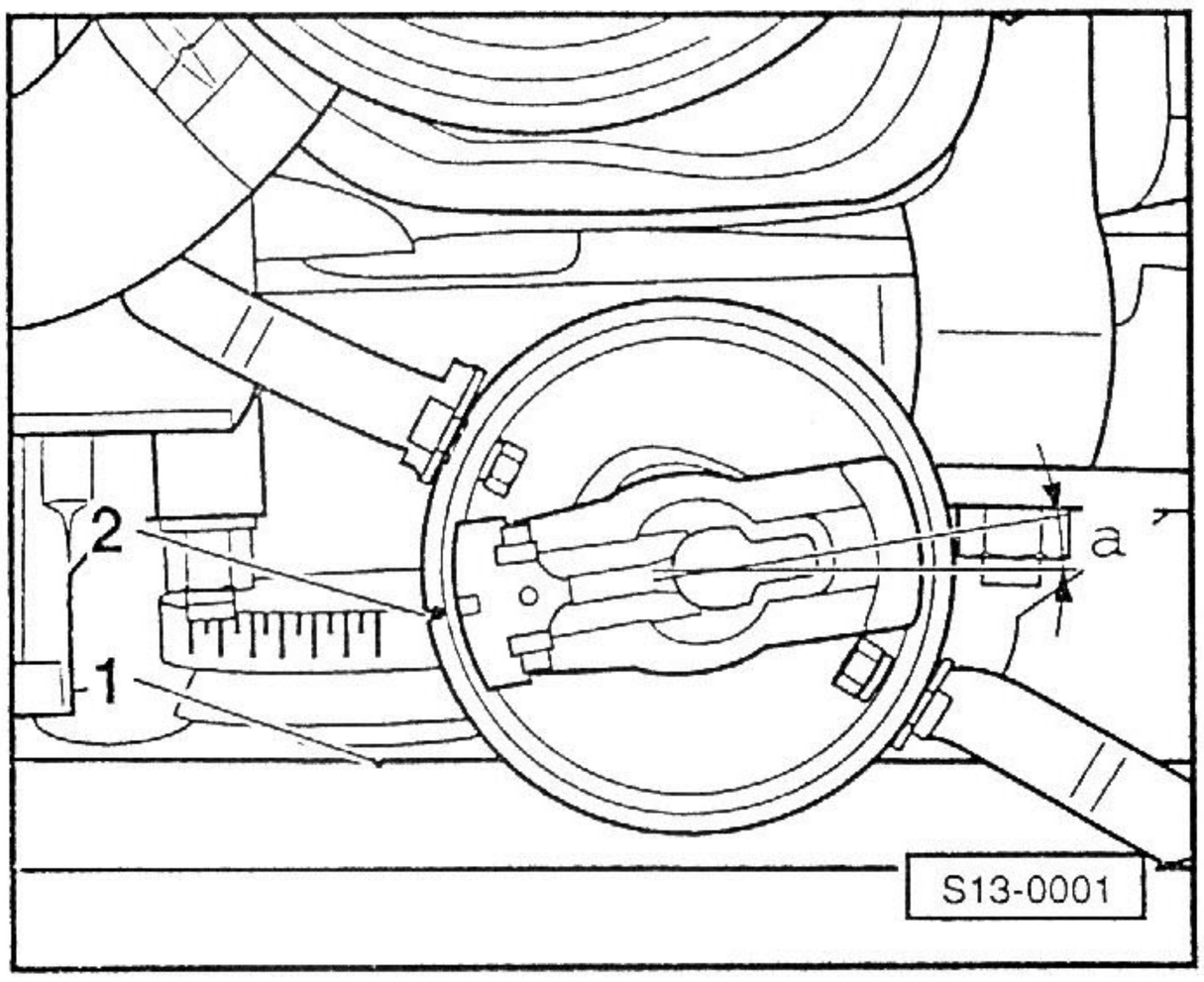
Special tools, testers and aids required

- Flywheel lock MP 1-504
- Sleeve for inserting timing case cover gasket MP 1-176

Removing

- Take off oil sump.
- Take off alternator.

For engines with distributor



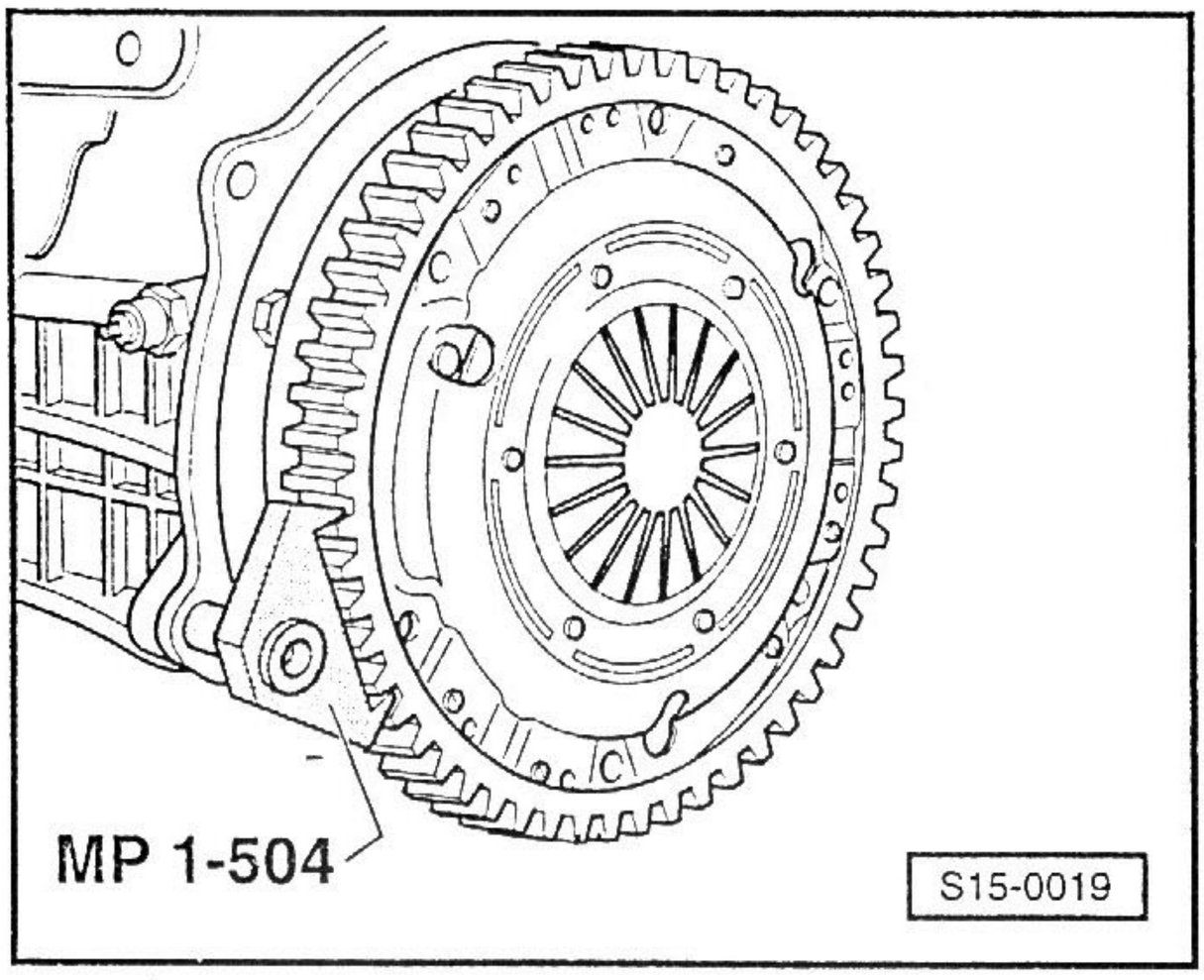
◄ - Crank engine into TDC position of cylinder 1.

- Position item -1-, marking on crankshaft belt pulley, opposite the marking 0 on engine block.
- Rotate item -2-, distributor rotor arm, to opposite the marking -dot- on the distributor housing (installation position of distributor in engine at an angle of alpha = 15°).
- Pull distributor out of the distributor holder.

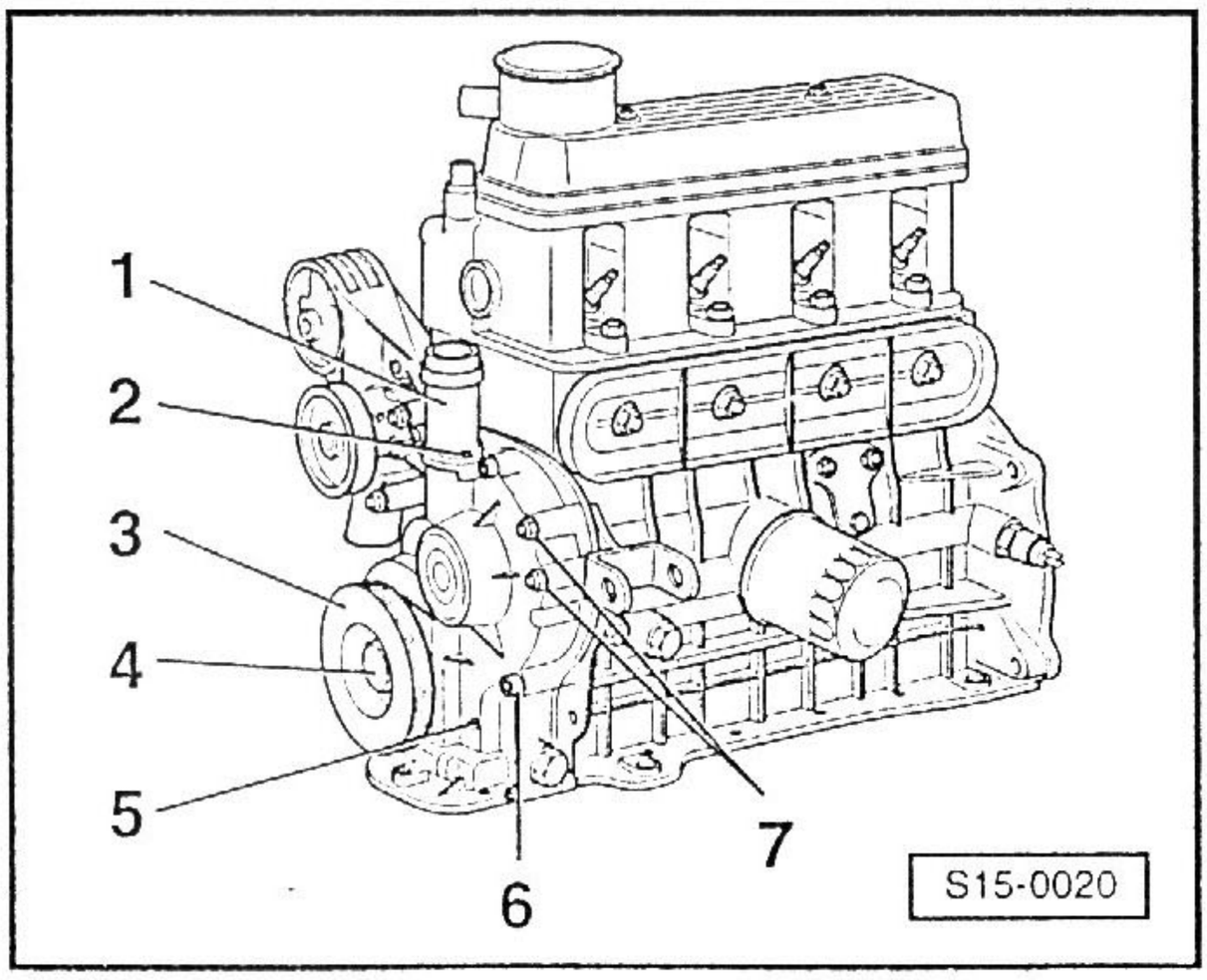
Engines 135M, 136M

- Remove cylinder head cover.
- Set valves of cylinder 4 to overlap.
- Set item -1-, marking on crankshaft belt pulley, opposite the marking 0 on engine block.

Continuation for all models

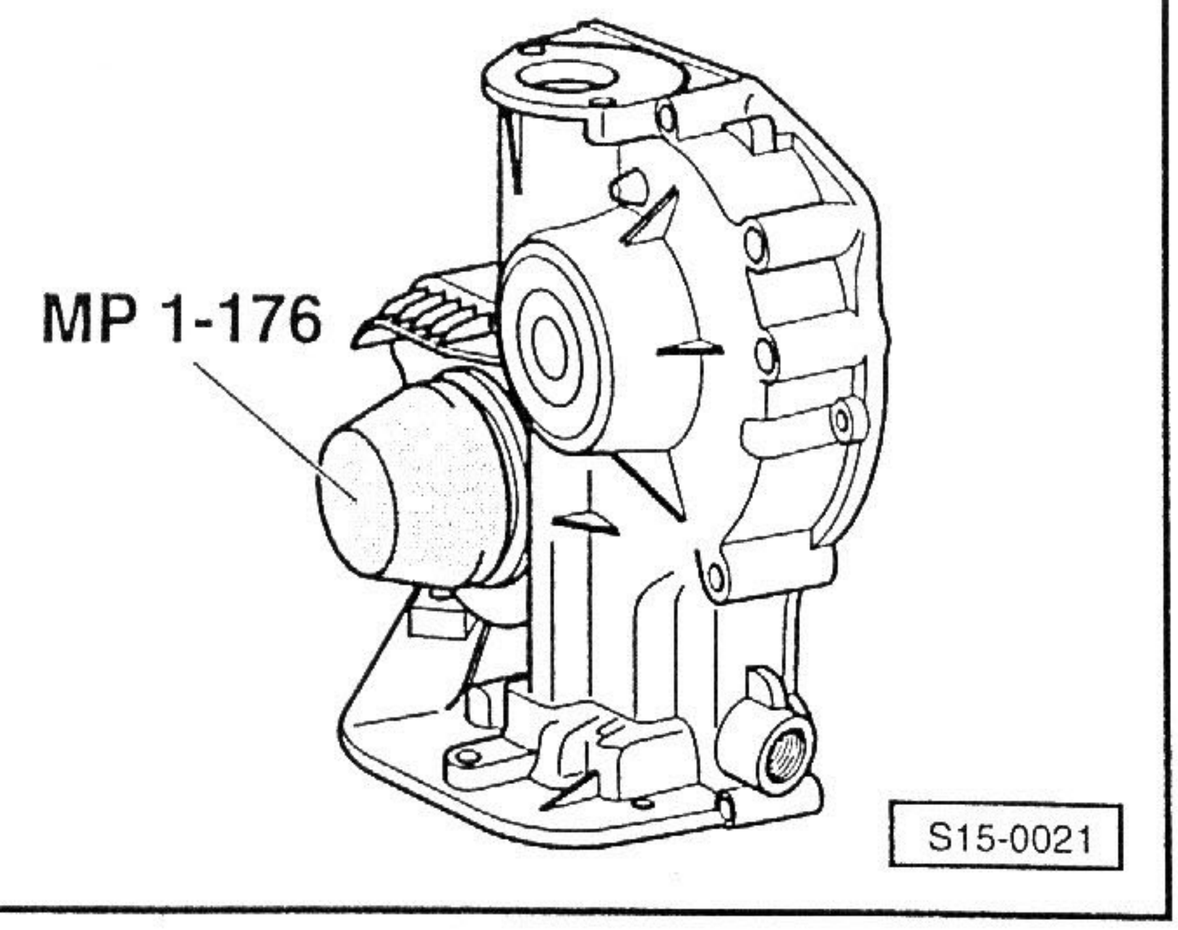


◄ - Lock flywheel with flywheel lock MP 1-504.



◄ - Unscrew bolts -2- and pull out distributor holder -1- and also plug, as necessary.

- Unscrew hexagon bolt -4- and take off belt pulley -3-.
- Unscrew hexagon nuts -7-.
- Unscrew hexagon socket bolt -6- (6 in total) and pull off timing gear cover -5-.
- Press seal out of timing gear cover.



Installing

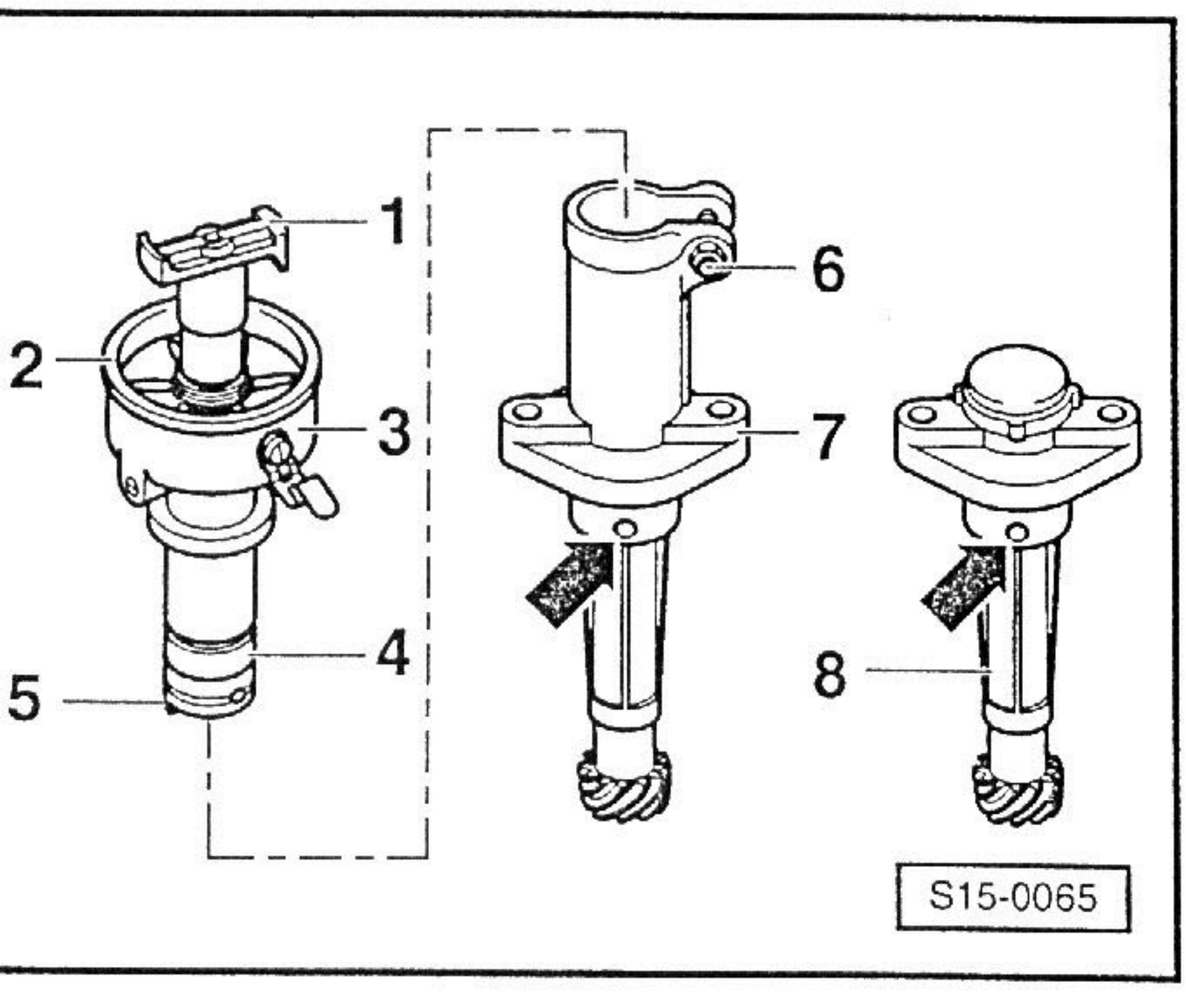
◄ - Fit on new seal with sealing lip facing to inside of timing gear cover and press in with sleeve MP 1-176.

- Lightly oil sealing lip of seal and fit on timing gear cover.

- Insert hexagon socket bolts and tighten to 8 Nm.

- Screw on new self-locking nuts (at alternator holder) and tighten to 25 Nm.

- Fit on belt pulley, insert hexagon bolt with washer and tighten to 120 Nm.



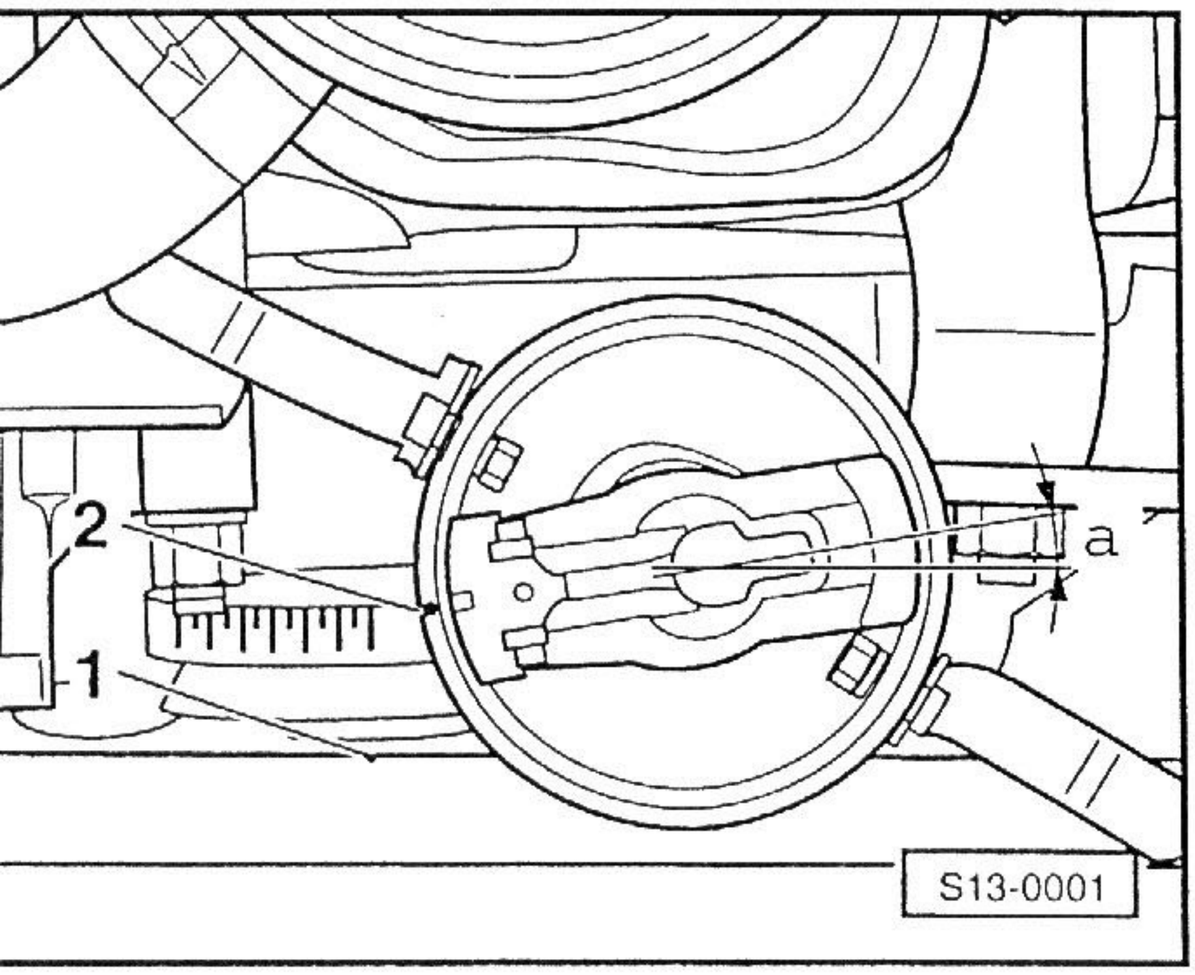
Engines with distributor

◄ - Inspect O-ring -4- and replace with new one if necessary.

- Insert distributor -3- into distributor holder -7- and clamp tight with hexagon bolt -6- to 8 Nm.

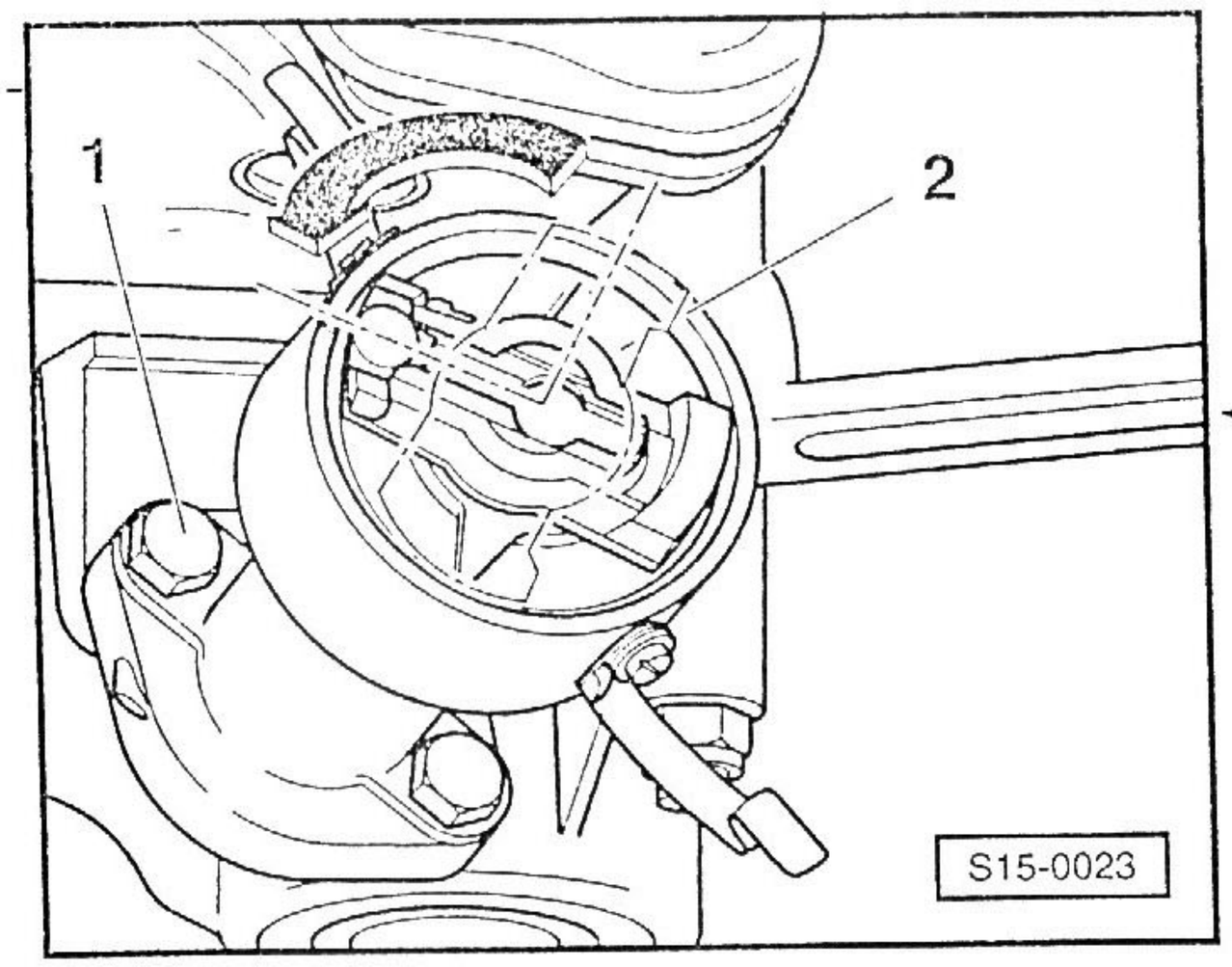
Notes:

- *The stud -5- on the distributor must be correctly inserted into the slot of the distributor shaft in the distributor holder.*
- *Install distributor holder or plug so that the lubrication drilling with ribs is facing toward the crankshaft belt pulley -arrow-.*



◄ - Insert distributor into timing gear cover so that the marking of the distributor rotor arm is aligned with the marking on the distributor holder item -2-.

- Turn distributor rotor arm accordingly, if necessary.



Engines 135M, 136M

- Insert plug into timing gear cover.

All engines

◄ - Insert hexagon bolts -1- and tighten to 8 Nm.

- Fit on oil sump ⇒ page 17-1

- Attach alternator and tension V-belt ⇒ Inspection and Maintenance; Inspecting condition and tension of ribbed V-belt, tensioning if necessary.

Note:

After assembling engines 135, 135B and 136B, check the positions of crankshaft belt pulley and distributor.

Removing and installing timing gears/ timing chain

Special tools, testers and aids required

♦ Straightedge

Removing

- Take off timing gear cover ⇒ page 15-18

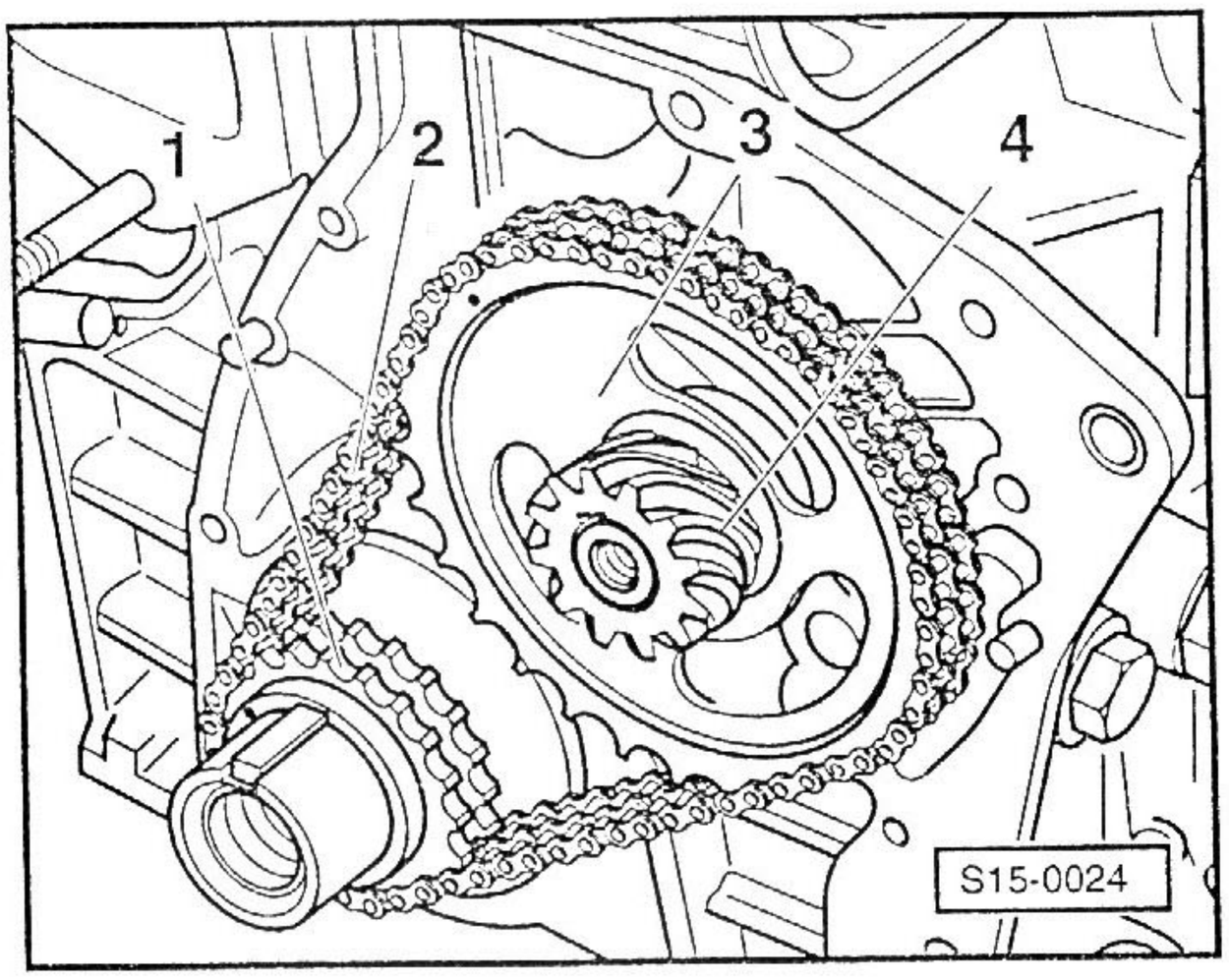
- Release bolt in front of the helical gear and unscrew.

◄ - Lever helical gear -4- off the camshaft.

- Evenly lever timing gears -1- and -3- together with timing chain -2- off the camshaft and the crankshaft.

- Remove shim, if fitted, supporting ring and guide ring from the crankshaft.

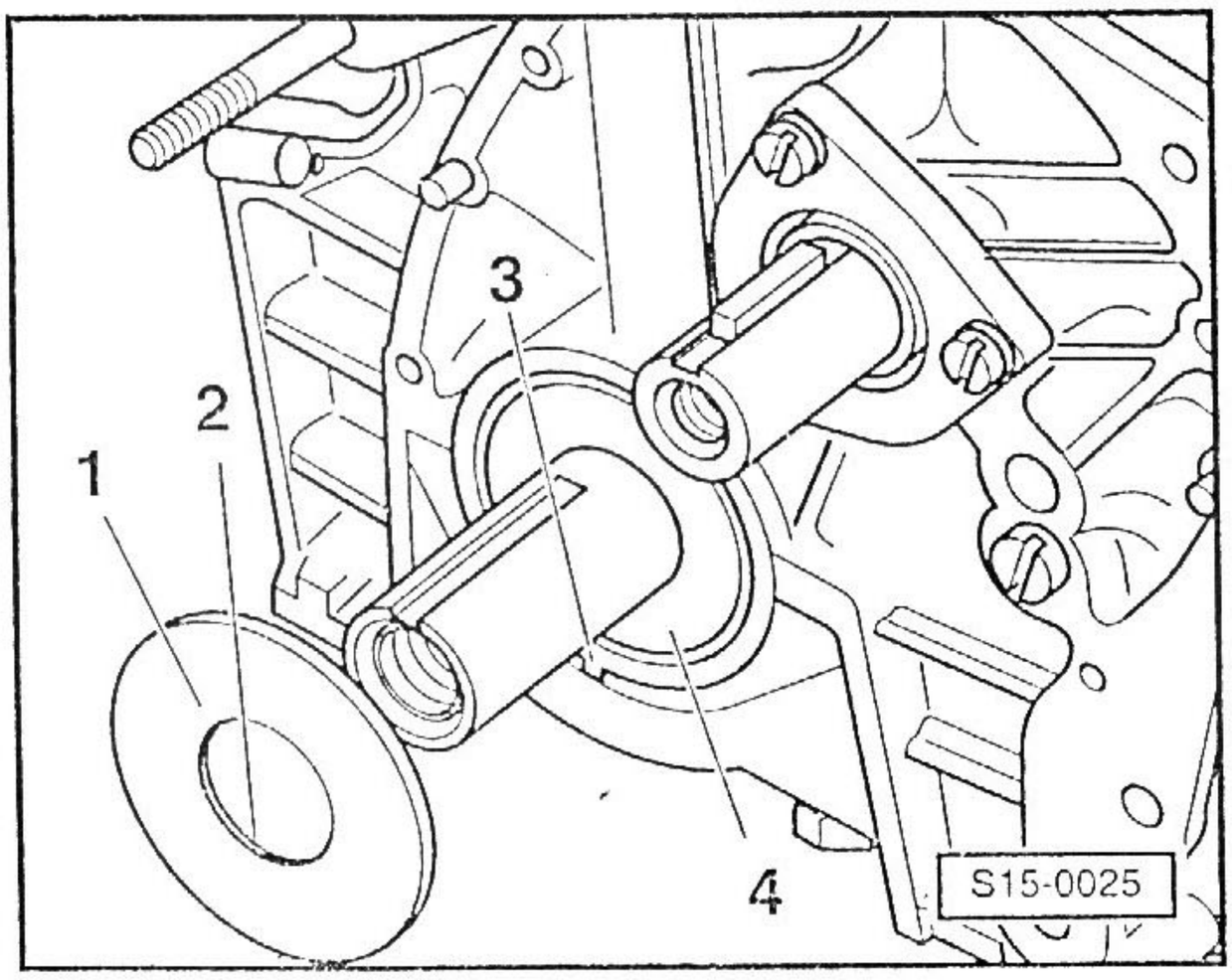
- Take timing gears out of the timing chain.

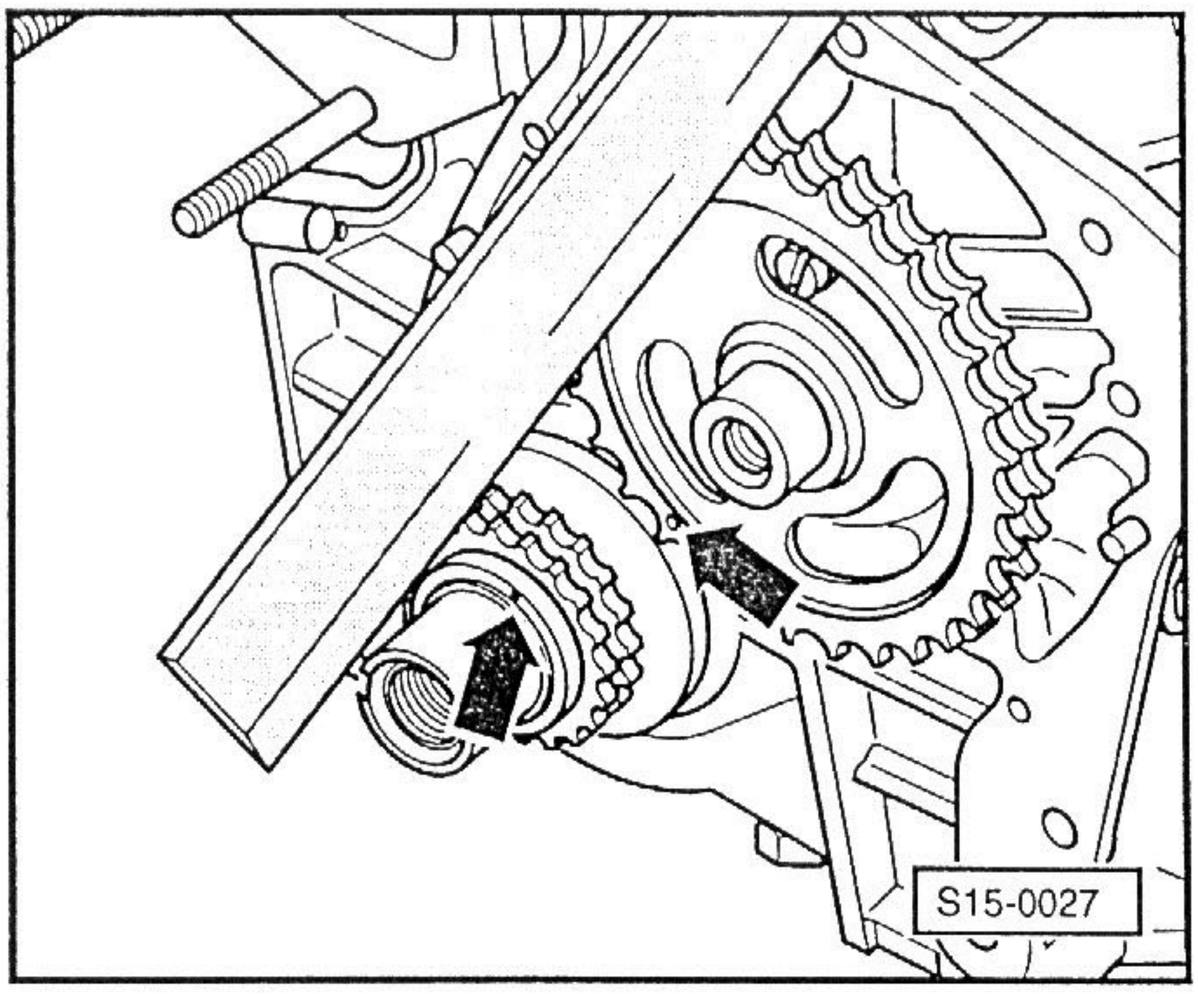


Installing

◄ - Insert guide ring -4- with lubricating grooves facing out so that the lug -3- is positioned in the slot of the crankshaft bearing cap.

- Push on supporting ring -1-, with inner chamfer -2- facing toward cylinder block.





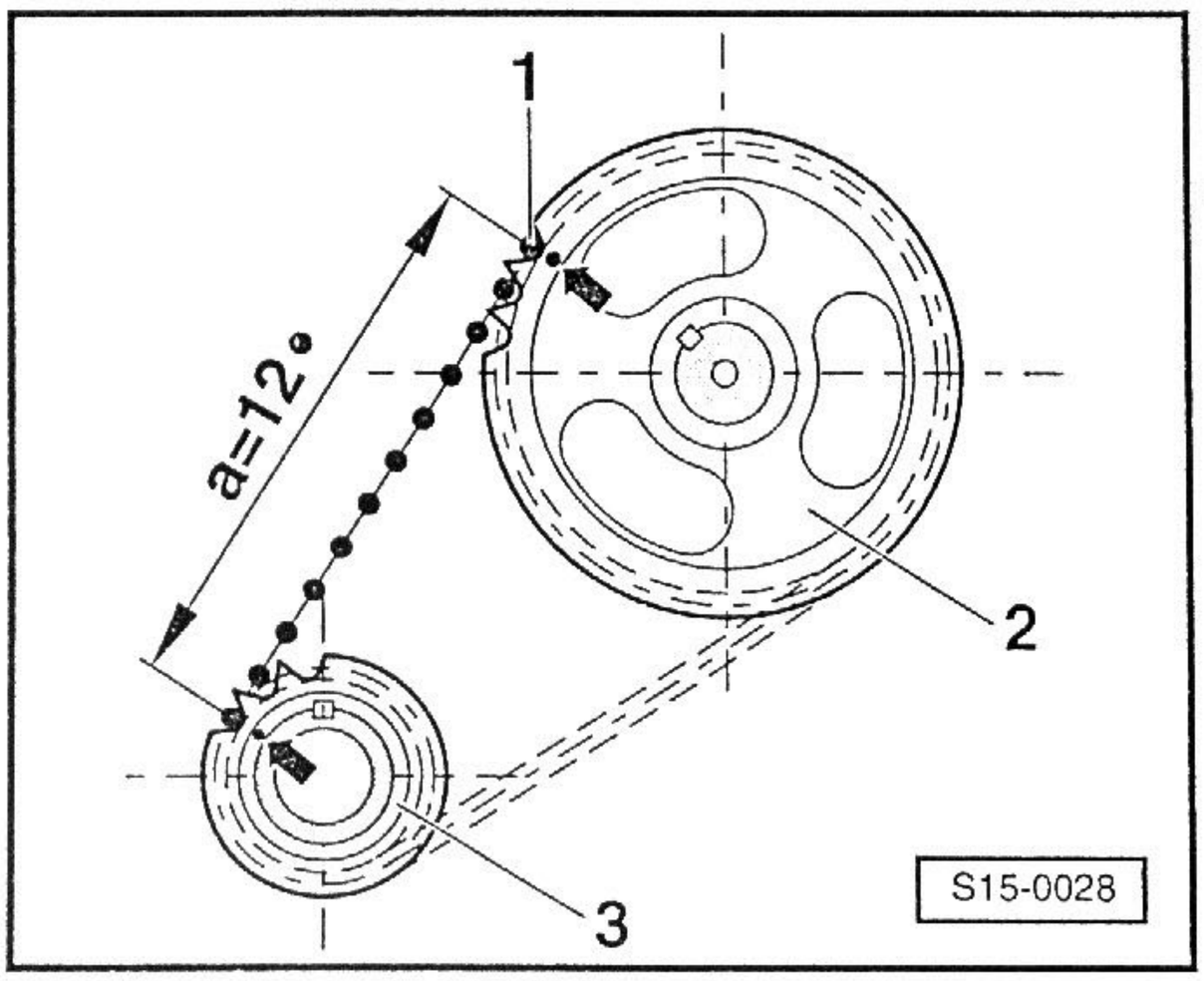
◄- Press on timing gears until fully home, with the timing markings -arrows- facing out.

- Check the alignment running of the timing gears. The timing gear on the crankshaft must be offset 0.1...0.2 mm.

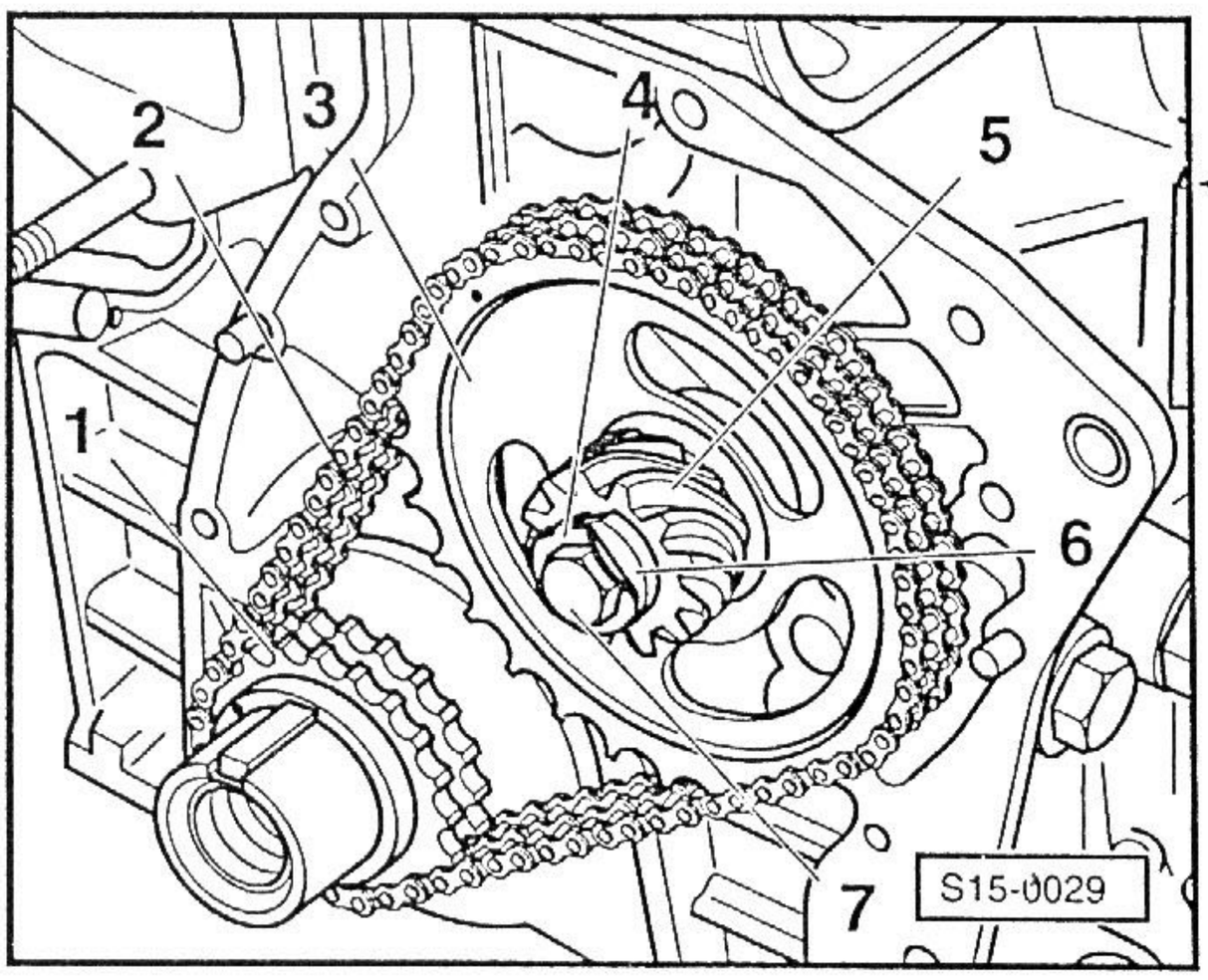
Note:

If the timing gear on the crankshaft is too low, fit on a shim between timing gear and supporting ring.

- Once again lever off timing gears.



◄- Insert timing gears -2- and -3- into the timing chain -1- so that a distance -a- of 12 chain link pins exist from marking to marking -arrows-.



- Fit shim, if necessary, over the crankshaft.

◄- Push on timing gears -1- and -3- with timing chain -2- fitted, until fully home.

- Push on helical gear -5- with the collar facing toward timing gear.

- Fit on washer -6-, new lock washer with bolt -7- .

Note:

The tab -4- of the lock washer must be positioned above the straight face of the washer.

- Tighten bolt -7- to 35 Nm and bend the lock washer in order to secure it on a straight face of the bolt head.

- Attach timing gear cover ⇒ page 15-19.

-

- Inspect timing when engine cold; set valve clearance at inlet and exhaust valves to 0.43 mm for this step.

Valve timing

Valve timing ⇒ Engine features, page 00-2.

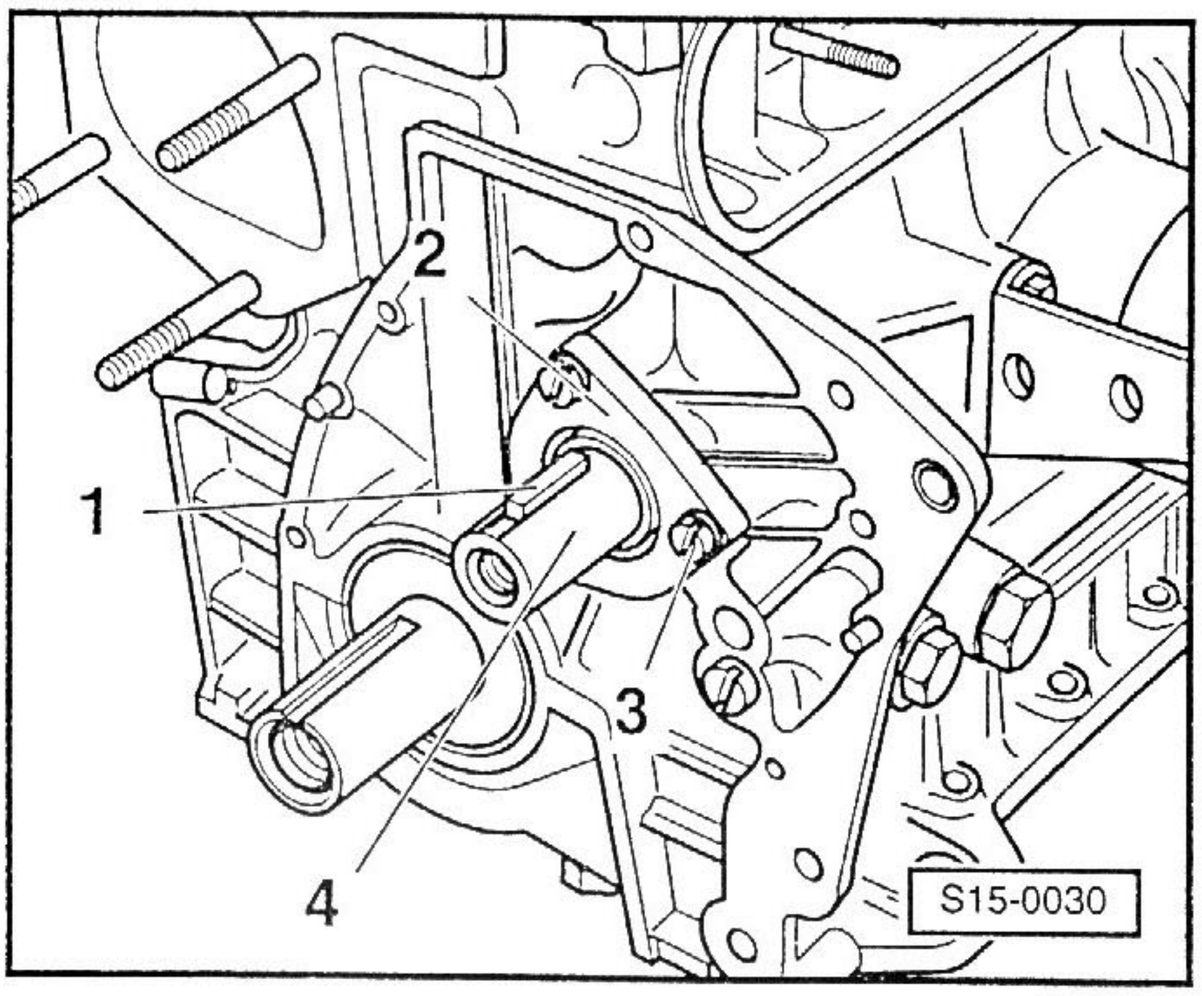
- After checking the timing, set inlet and exhaust valves ⇒ page 15-6

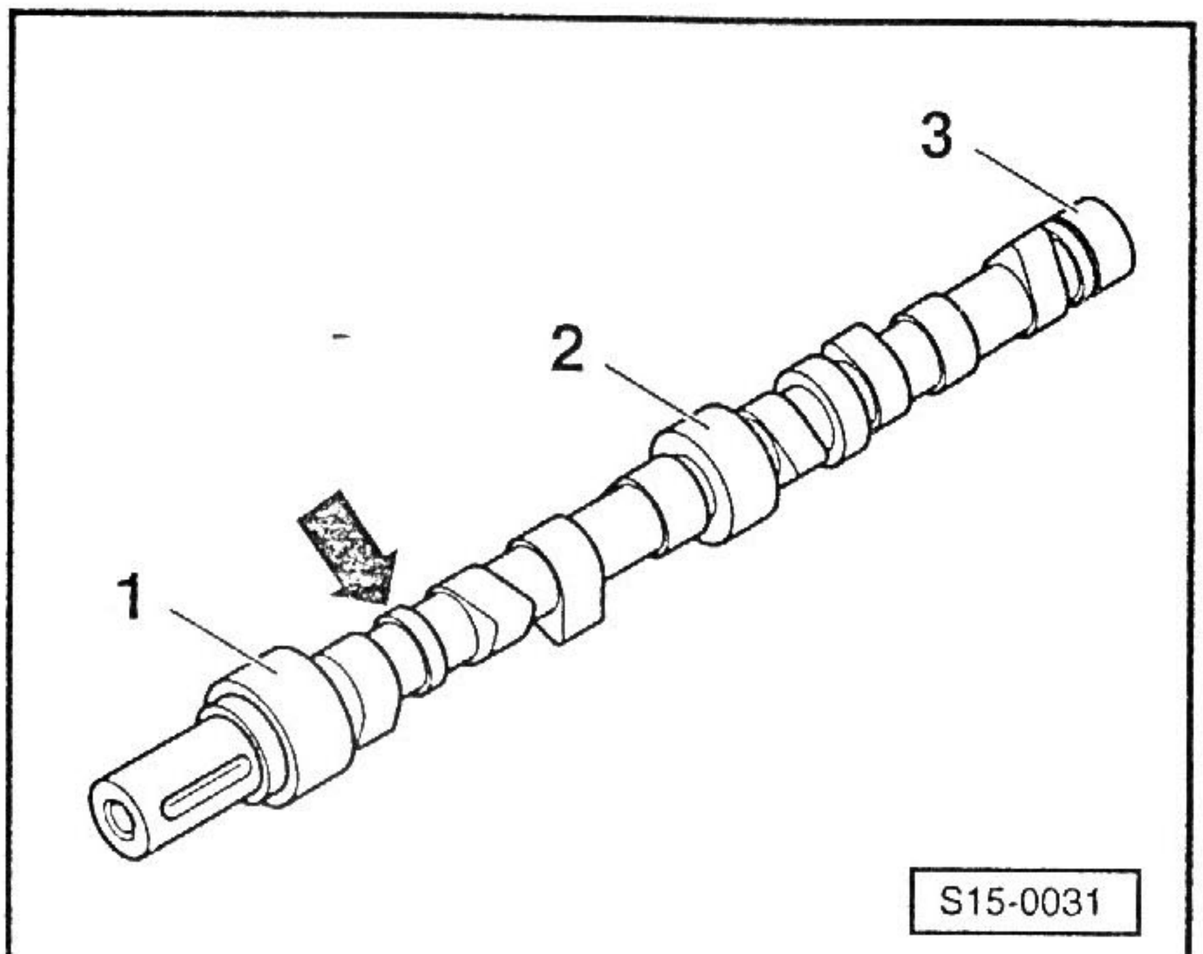
Removing and installing camshaft

- Take off timing gears ⇒ page 15-20
- Remove valve tappets ⇒ page 15-1

◀ - Unscrew bolts -3- and take off flange -2-.

- Pull camshaft -4- out of the engine housing.
- If the camshaft is replaced, take off parallel key -1-.





◀ - Inspect bearing points of the camshaft.

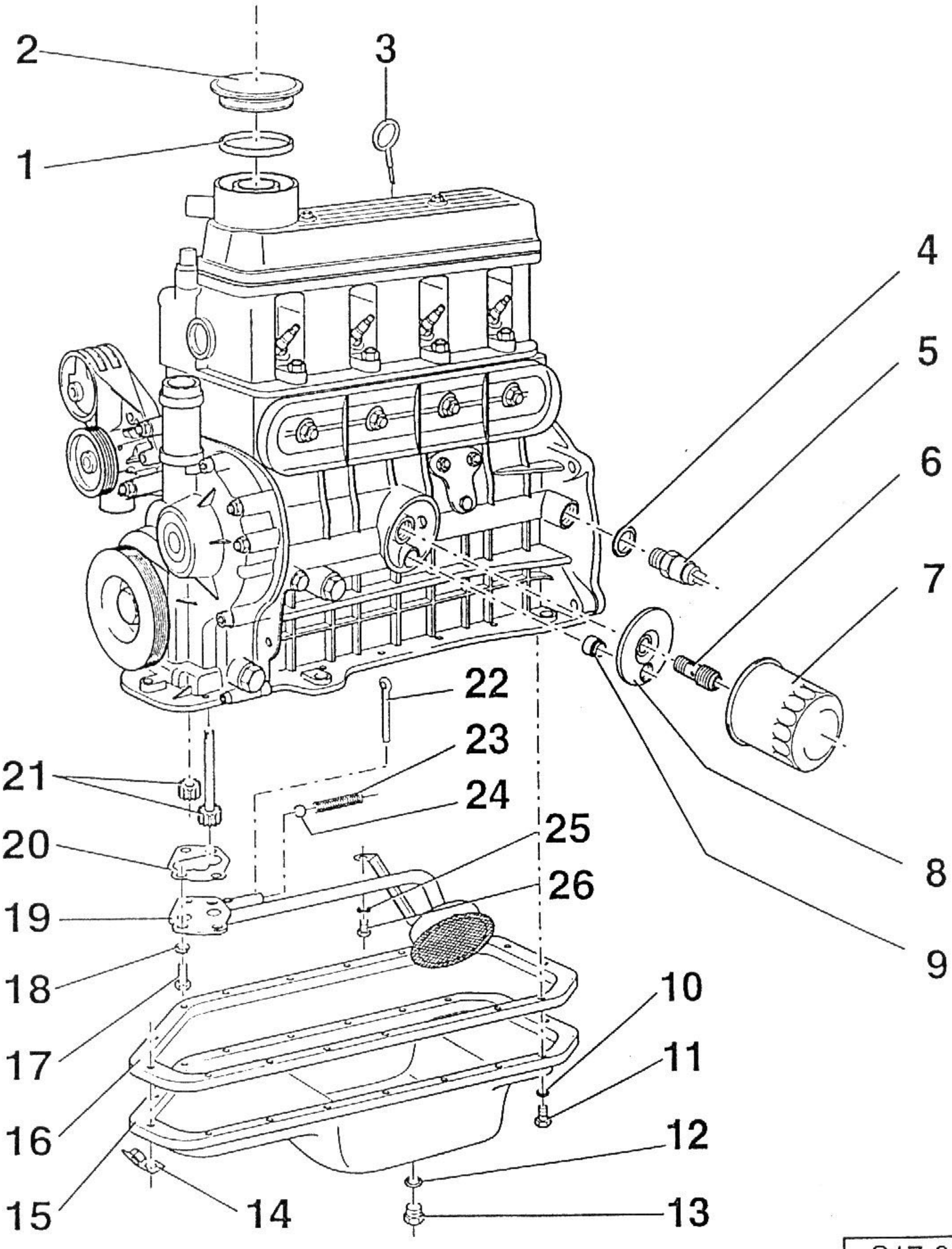
Bearing point	Ø of cam-shaft mm	Tole-rance mm	Ø in engine block mm	Tole-rance mm
Front -1-	39	-0.050	39	+0.025
Middle -2-	38.5	-0.025	38.5	-0.000
Rear -3-	30	-0.041 -0.020	30	+0.021 -0.000

Identification:

On engines 136B and 136M a yellow marking -arrow- is provided between the cams of the first cylinder.

On engines 135, 135B, 135M the camshaft has no marking.

Removing and installing parts of the lubrication system



Notes:

- *If fairly large quantities of metal swarf and abrasion -caused by fretting damage such as crankshaft and conrod bearing damage- are found in the engine oil when performing repairs to the engine, carefully clean oil passages in order to avoid consequential damage.*
- *The oil level must not extend beyond the max. marking -risk of damage to catalytic converter-!*

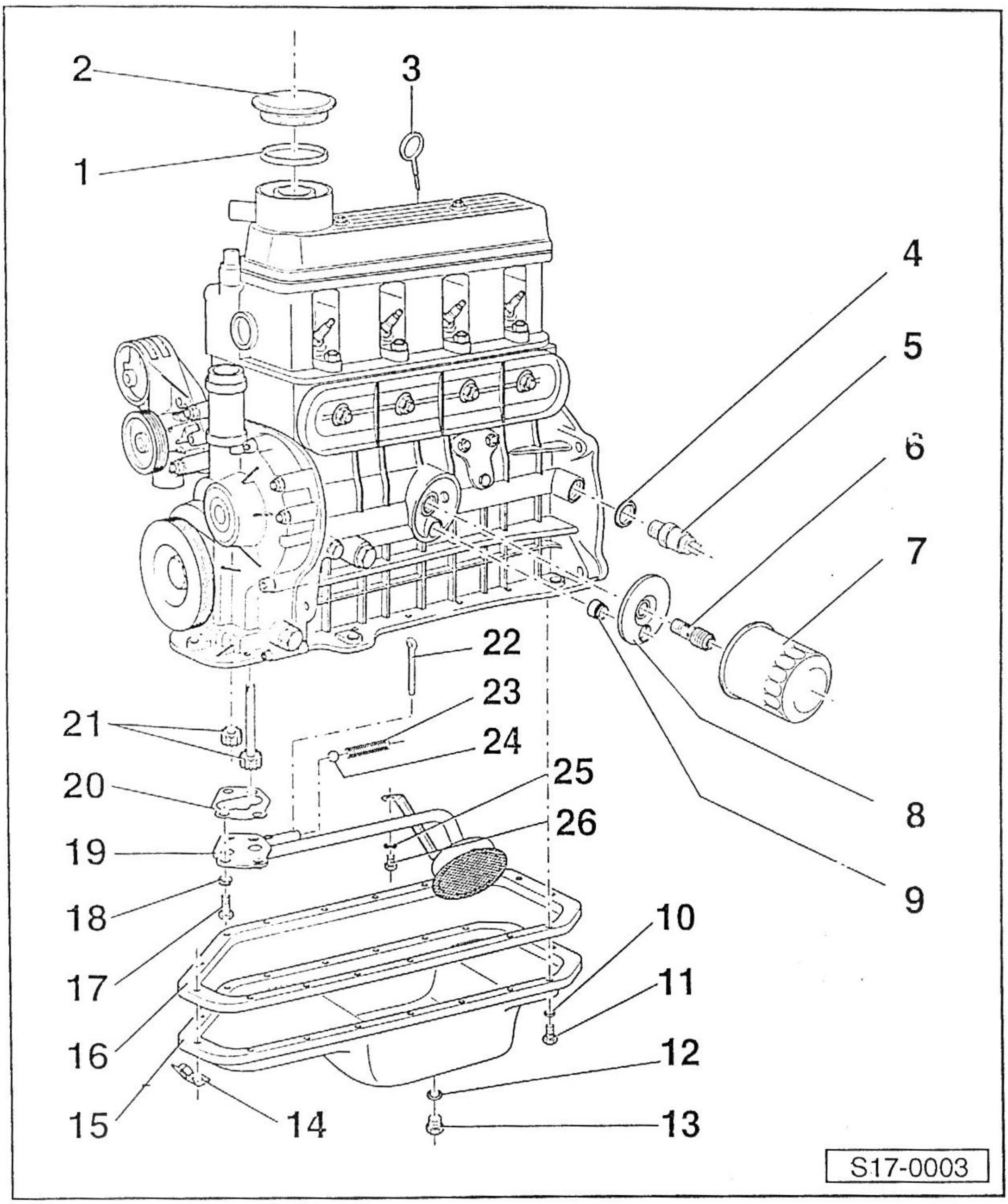
Testing oil pressure ⇒ page 17-6

Oil capacities:

without oil filter 4 litres

with oil filter 4.5 litres

Engine oil specification:
⇒ Workshop Manual Inspection and Maintenance, Changing engine oil.



1 - Seal
- Replace if damaged

2 - Cap

3 - Dipstick
- Oil level must not extend beyond the max. marking!

4 - Seal
- Replace

5 - 0.4...0.6 bar oil pressure switch (F1)
- 55 Nm
- Testing ⇒ page 17-6

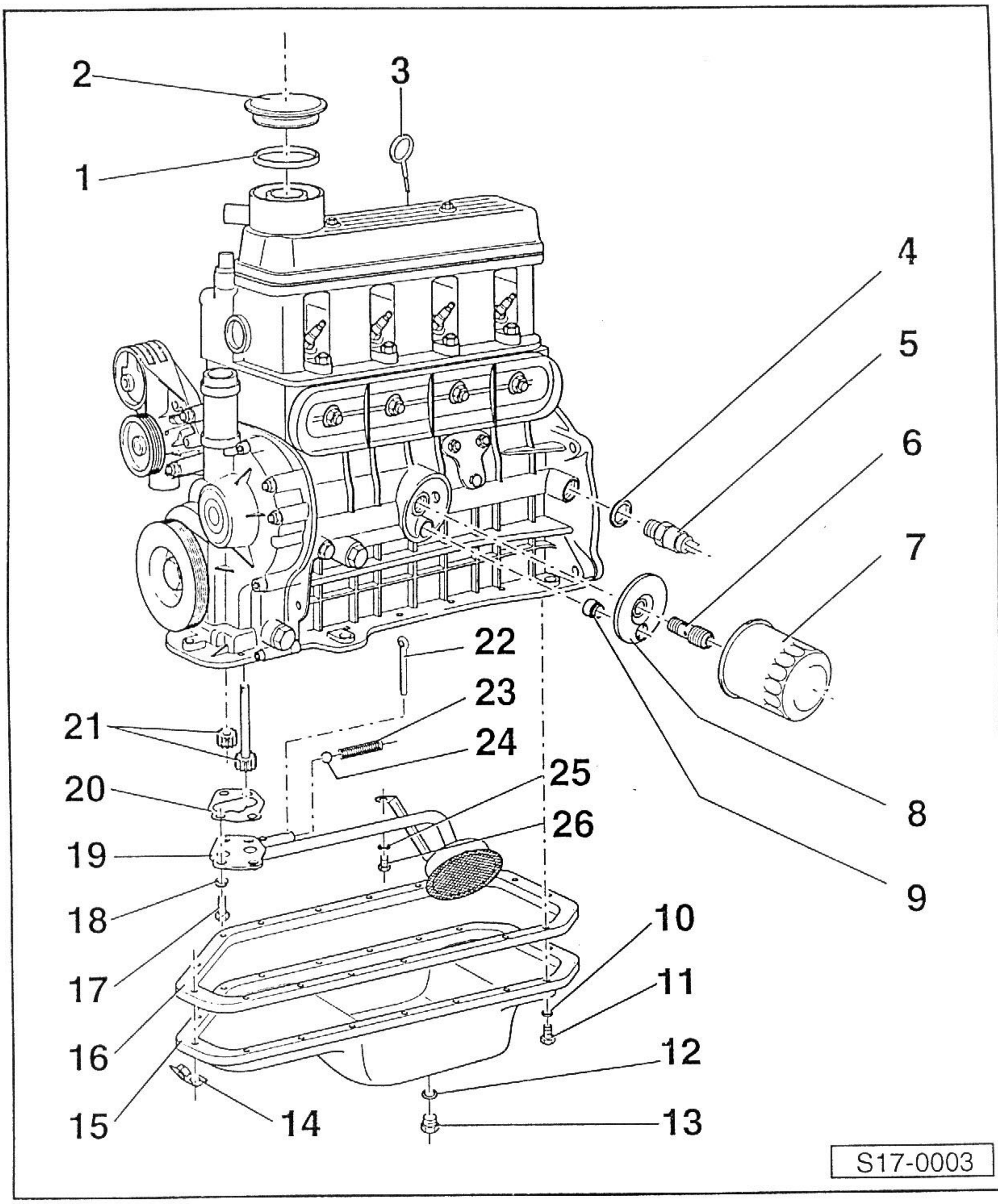
6 - Oil filter screw
- 55 Nm

7 - Oil filter
- Use U-type wrench for slackening
- Apply a thin film of oil to seal
- Tighten by hand, 30 Nm
- Check for leaks after filling with oil

8 - Oil filter partition
- With chamfer facing out

9 - Centering insert

10 - Spring lock washer



11 - Hexagon bolt
- ♦ 10 Nm
- ♦ Tightening diagram ⇒ page 17-5, Fig. 1

12 - Seal
- ♦ Replace

13 - Oil drain plug
- ♦ 65 Nm

14 - Bracket

15 - Oil sump
- ♦ Clean sealing surface before installing

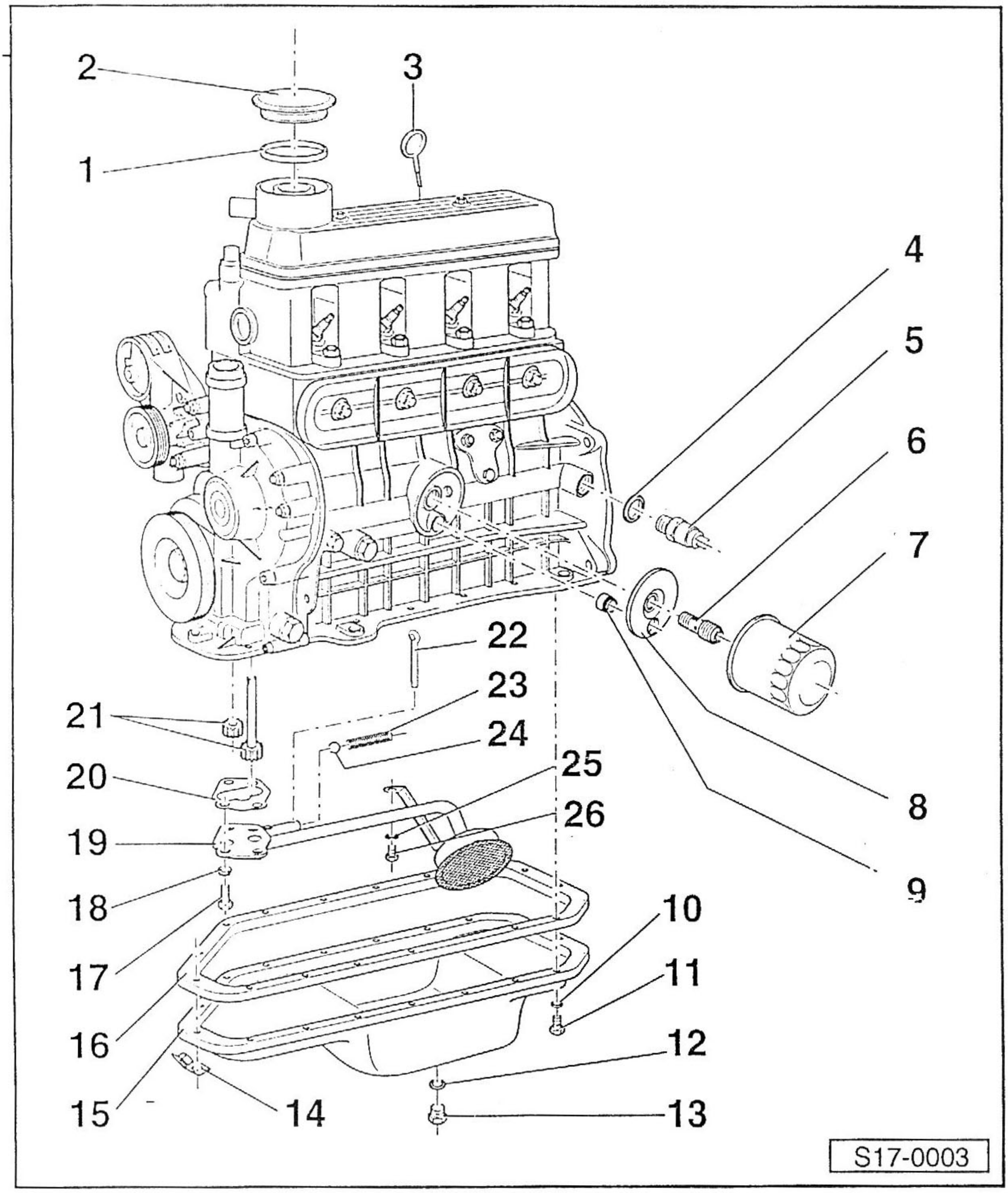
16 - Gasket
- ♦ Replace

17 - Hexagon bolt
- ♦ 8 Nm

18 - Spring lock washer

19 - Oil pump suction bell
- ♦ Clean strainer if dirty

20 - Gasket
- ♦ Only fit on if axial play of oil pump gears is not sufficient ⇒ page 17-5, Fig. 2



21 - Gears
- Checking axial play ⇒ page 17-5, Fig. 2

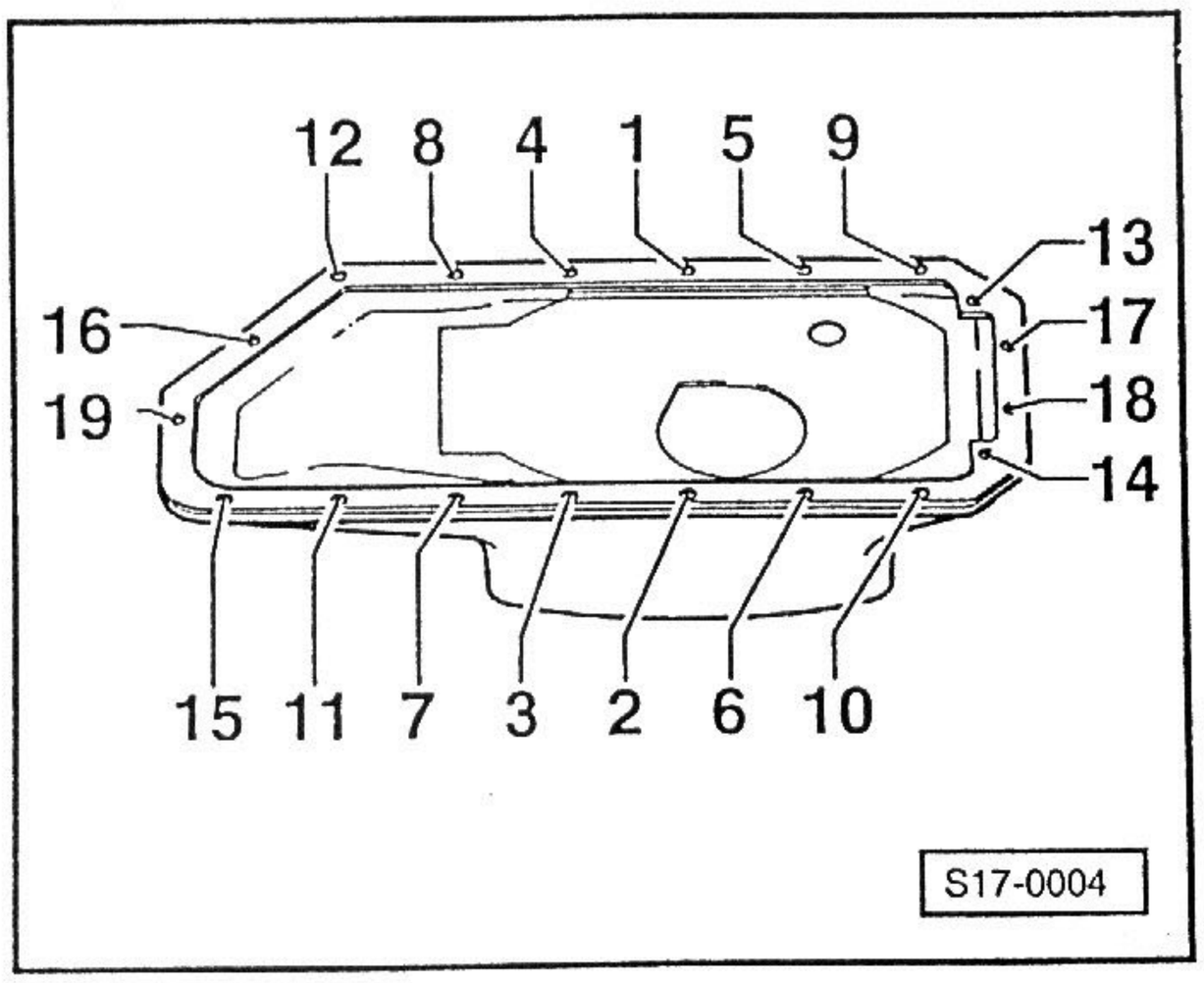
22 - Split pin
- Replace

23 - Compression spring

24 - **Pressure relief valve ball**
- Opening pressure: 5.8 bar
- After inserting, knock lightly with aluminium drift so that ball seat is smooth

25 - **Spring lock washer**

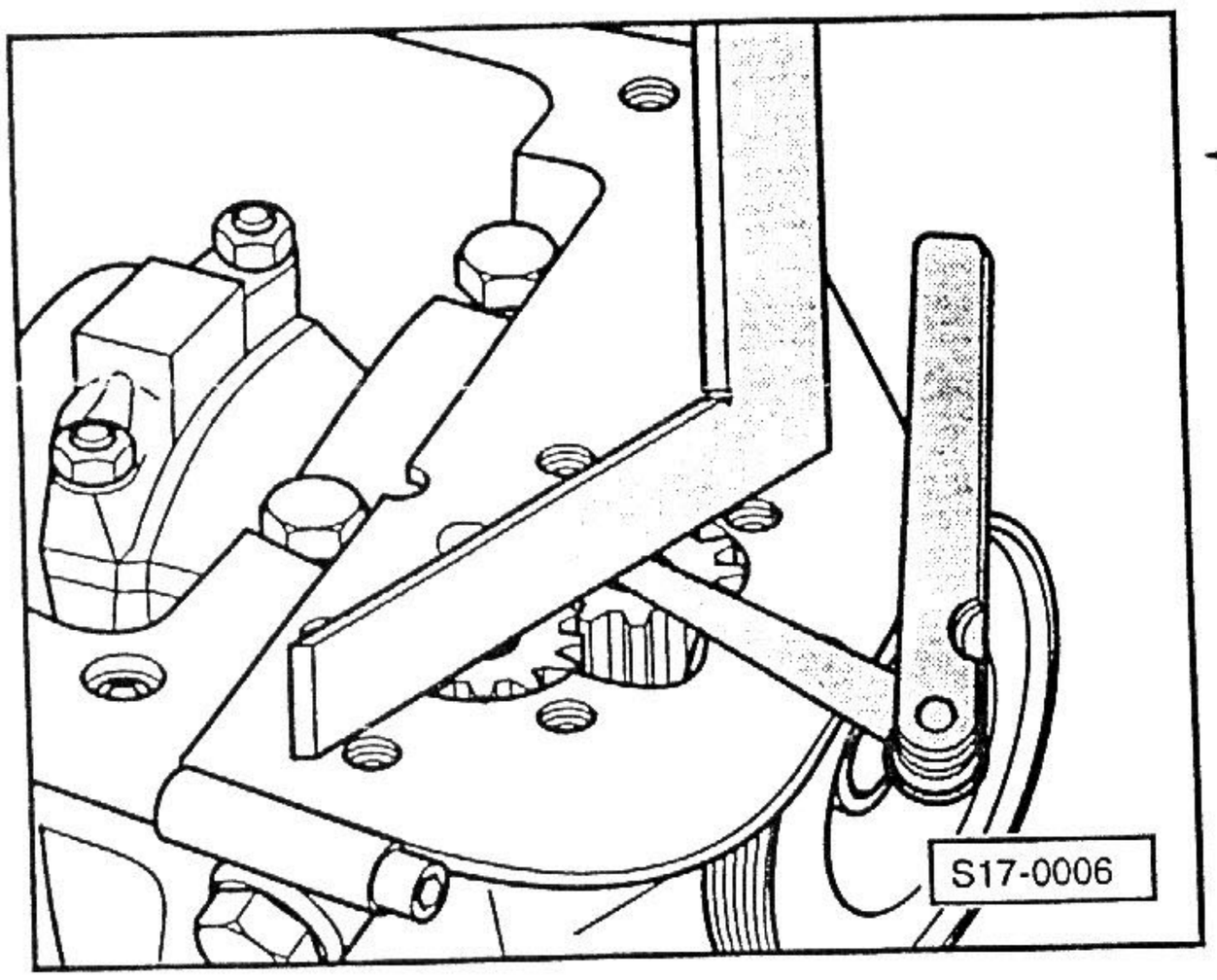
26 - **Hexagon bolt**
- 8 Nm



Special tools, testers and aids required

- Torque wrench e.g. V.A.G 1331 (5...50 Nm)
- Feeler gauge
- Straightedge

◄ **Fig. 1 Tightening diagram of oil sump**

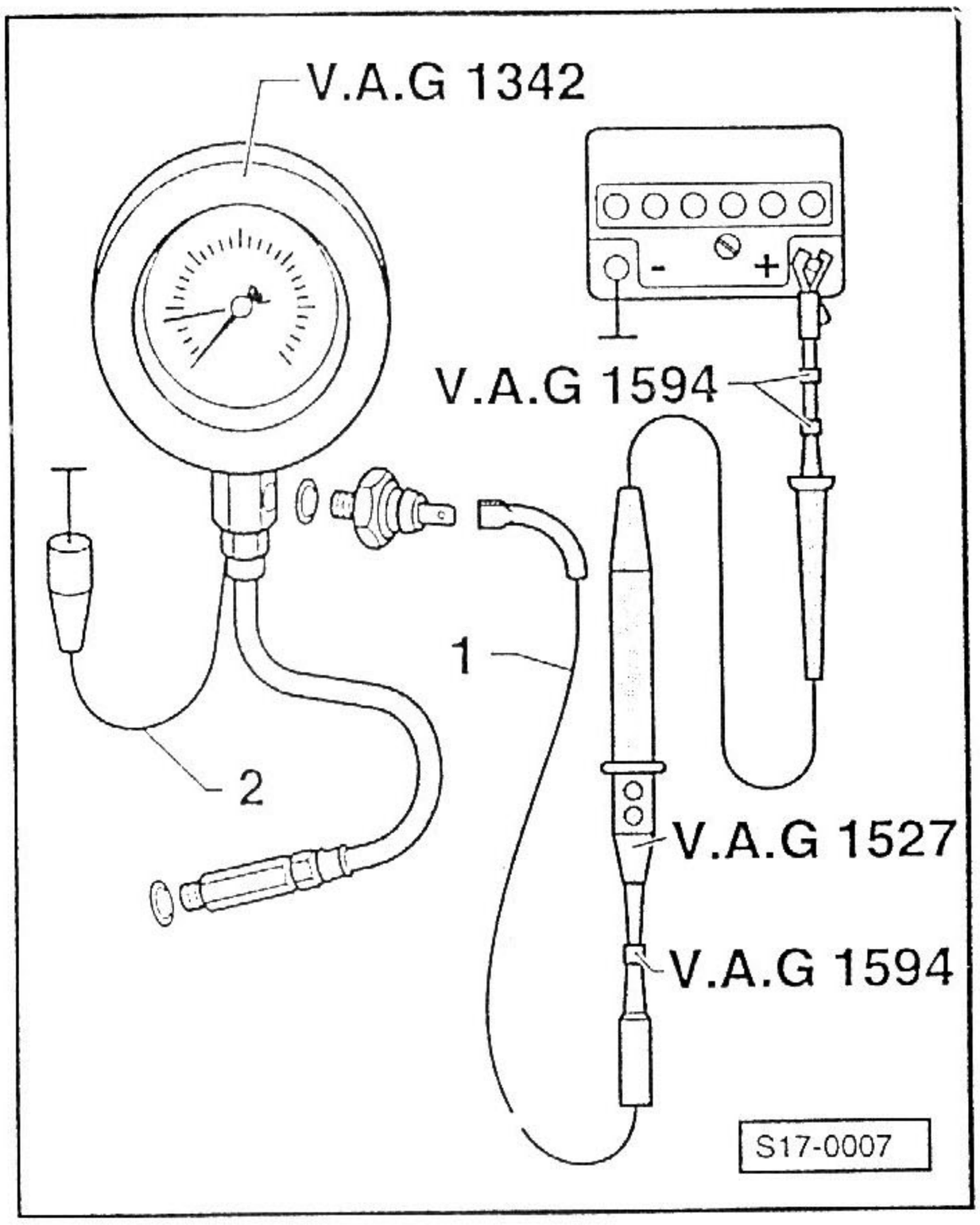


◄ **Fig. 2 Checking axial play of oil pump**

max. 0.1 mm

Notes:

- *If the wear limit is reached, replace timing gear cover ⇒ page 15-18.*
- *If no axial play exists, the gasket ⇒ page 17-3, item 20, must be fitted on.*



Testing oil pressure and oil pressure switch

Special tools, testers and aids required

- Tester V.A.G 1342
- Diode test lamp V.A.G 1527
- Auxiliary cables V.A.G 1594

Note:

Operational check and servicing visual oil pressure indicator:

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

◄ - Remove 0.4...0.6 bar oil pressure switch and screw into the tester.

- Screw tester into the cylinder block in place of the oil pressure switch.

- Connect brown cable -2- of the tester to earth (-).

- Use auxiliary cables from V.A.G 1594 to connect diode test lamp V.A.G 1527 to battery positive (+) and to 0.4...0.6 bar oil pressure switch -1-. LED must light up.

- Start engine and slowly rev up. The LED must go out when the pressure is 0.4...0.6 bar; if not, replace 0.4...0.6 bar oil pressure switch.

- Increase revs further.

The oil pressure must be at least 3.8 bar at engine speed of 3000 rpm and oil temperature of 80 °C.

- If engine is revved higher, the oil pressure must not exceed 5.8 bar.

Removing and installing parts of the cooling system

Important!

- *When the engine is warm, the cooling system is pressurized. Before performing repairs, allow engine to cool down to a coolant temperature of about 40°C and release pressure.*
- *Coolant additives are harmful to health!*
- *Do not inhale coolant vapours. Do not swallow coolant. Avoid contact with skin and eyes.*

Note:

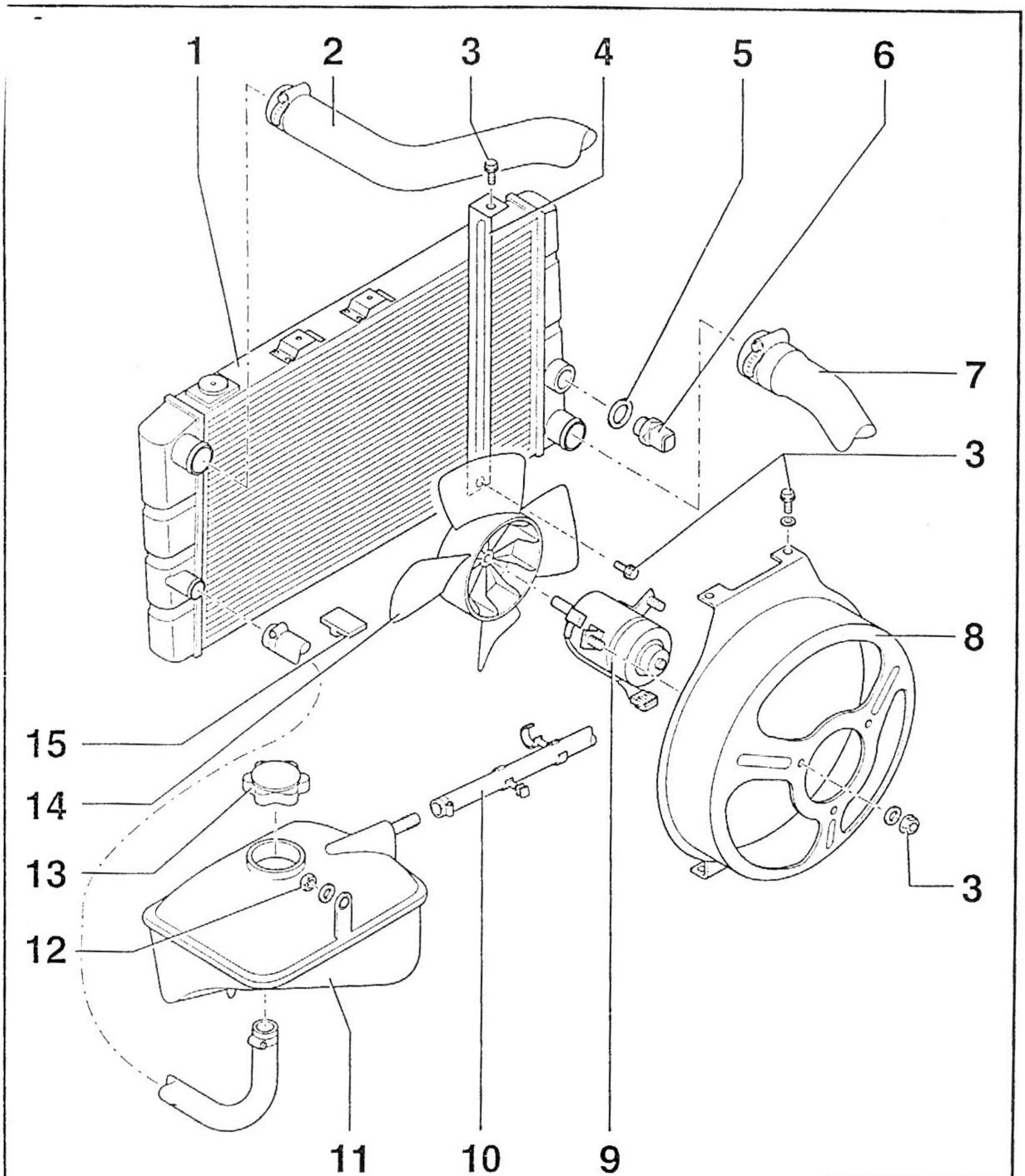
All the hose connections are secured with screw-type clips.

Draining and pouring in coolant ⇒ page 19-8.

Coolant concentration specifications
⇒ page 19-8, Draining and pouring in coolant.

Testing cooling system for leaks ⇒ page 19-11.

Parts of the cooling system attached to body



1 - Radiator
- ♦ Removing and installing ⇒ page 19-21
- ♦ Replace the entire coolant after fitting new radiator

2 - **Top coolant hose**
- ♦ To connection fitting ⇒ page 19-6, item 4

3 - Hexagon bolt
- ♦ 10 Nm

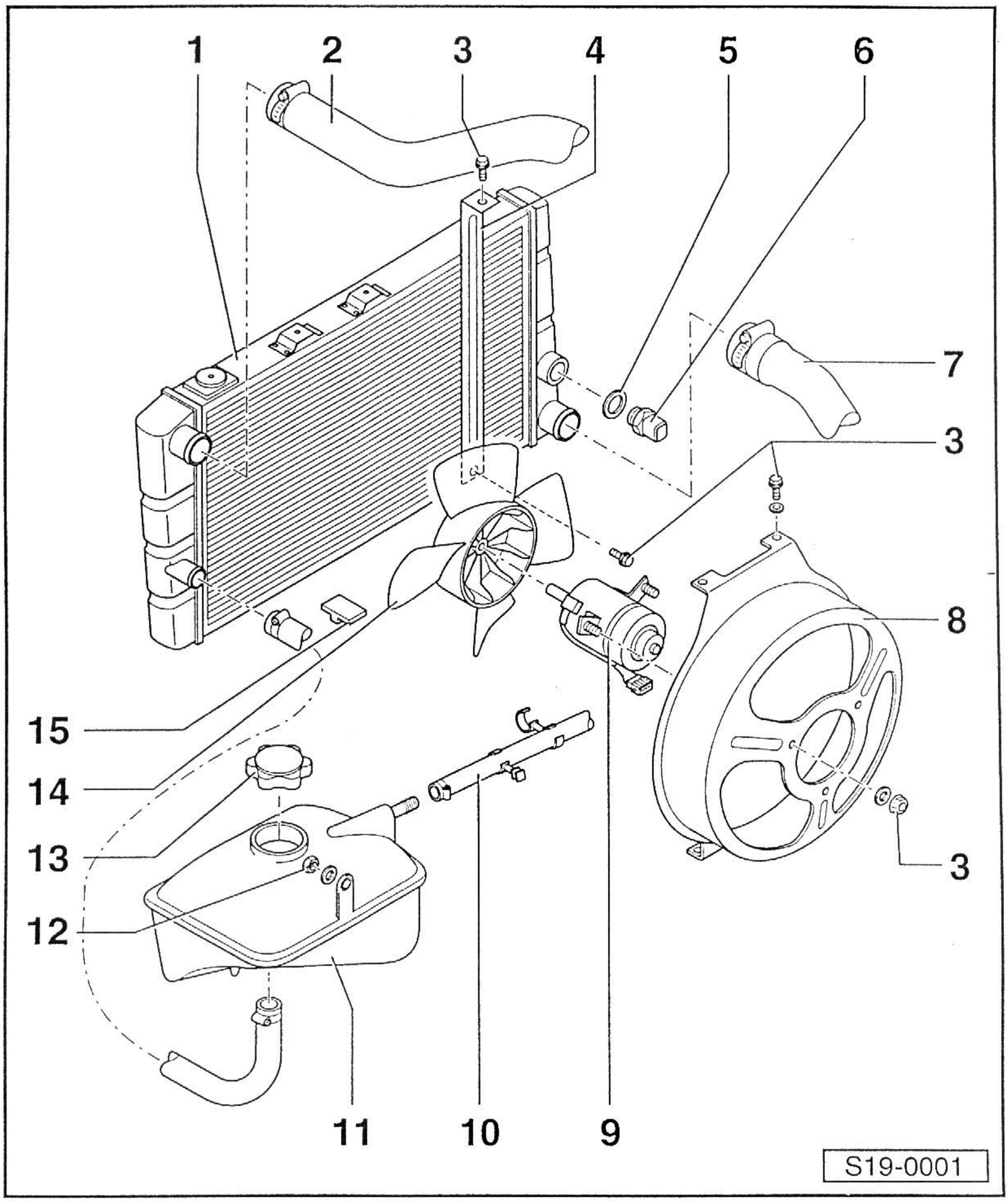
4 - Strut

5 - Seal
- ♦ Replace

6 - **Thermostatic switch (F18), 42 Nm**
- ♦ For electric fan
- ♦ Switching temperatures:
  on: 94...99°C
  off: 88°C

7 - **Bottom coolant hose**
- ♦ To coolant pipe ⇒ page 19-4, item 4

8 - Fan ring



9 - Fan for radiator (V7)
- ♦ Removing and installing
  ⇒ page 19-21

10 - To coolant thermostat housing
- ♦ ⇒ page 19-6, item 1

11 - Expansion tank

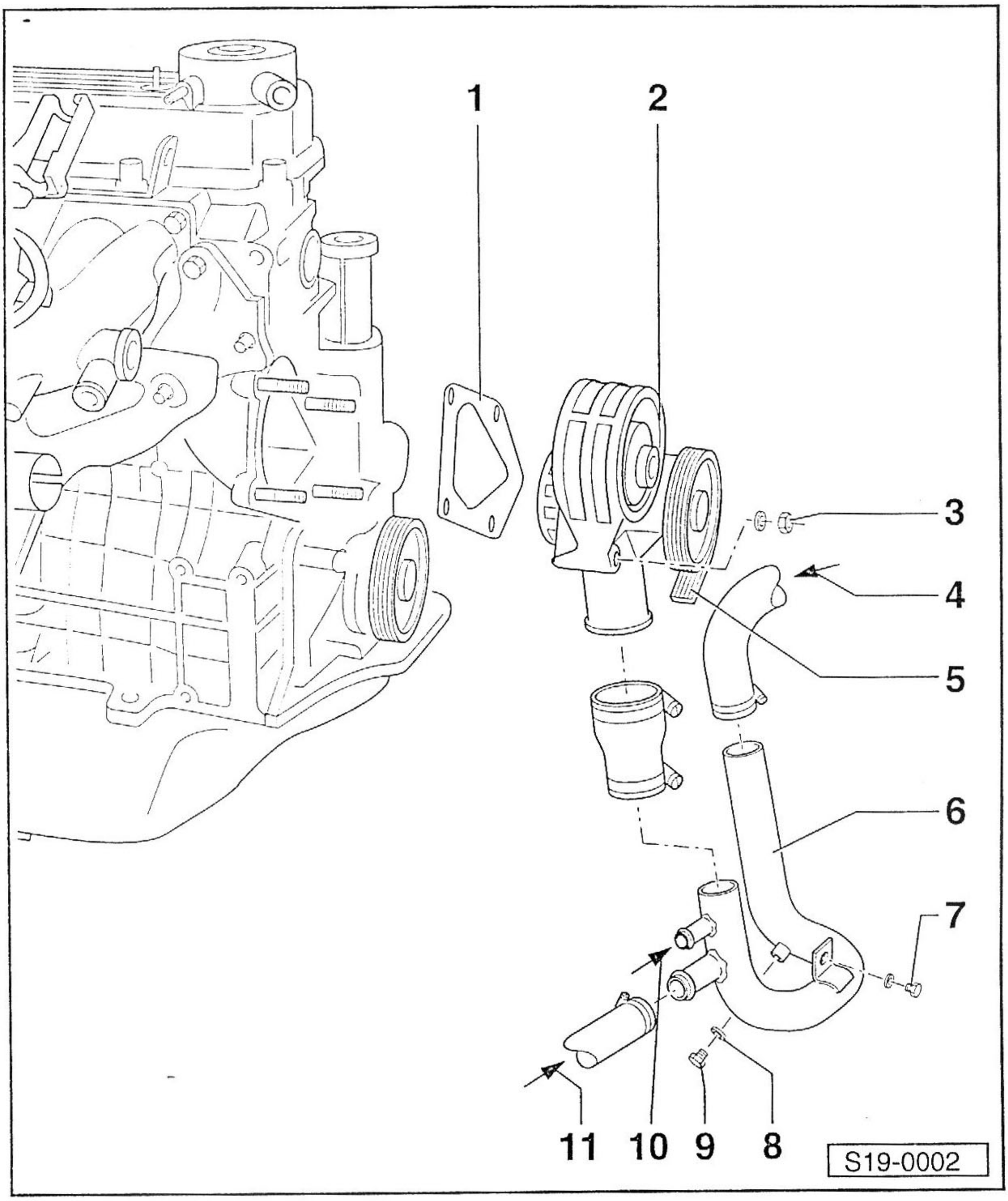
12 - Hexagon nut
- ♦ 4 Nm

13 - Pressure cap
- ♦ Test pressure 0.9...1.1 bar

14 - Fan wheel
- ♦ Removing and installing
  ⇒ page 19-21

15 - Base

Parts of cooling system attached to engine



Coolant pump end

1 - **Gasket**
- ♦ Replace

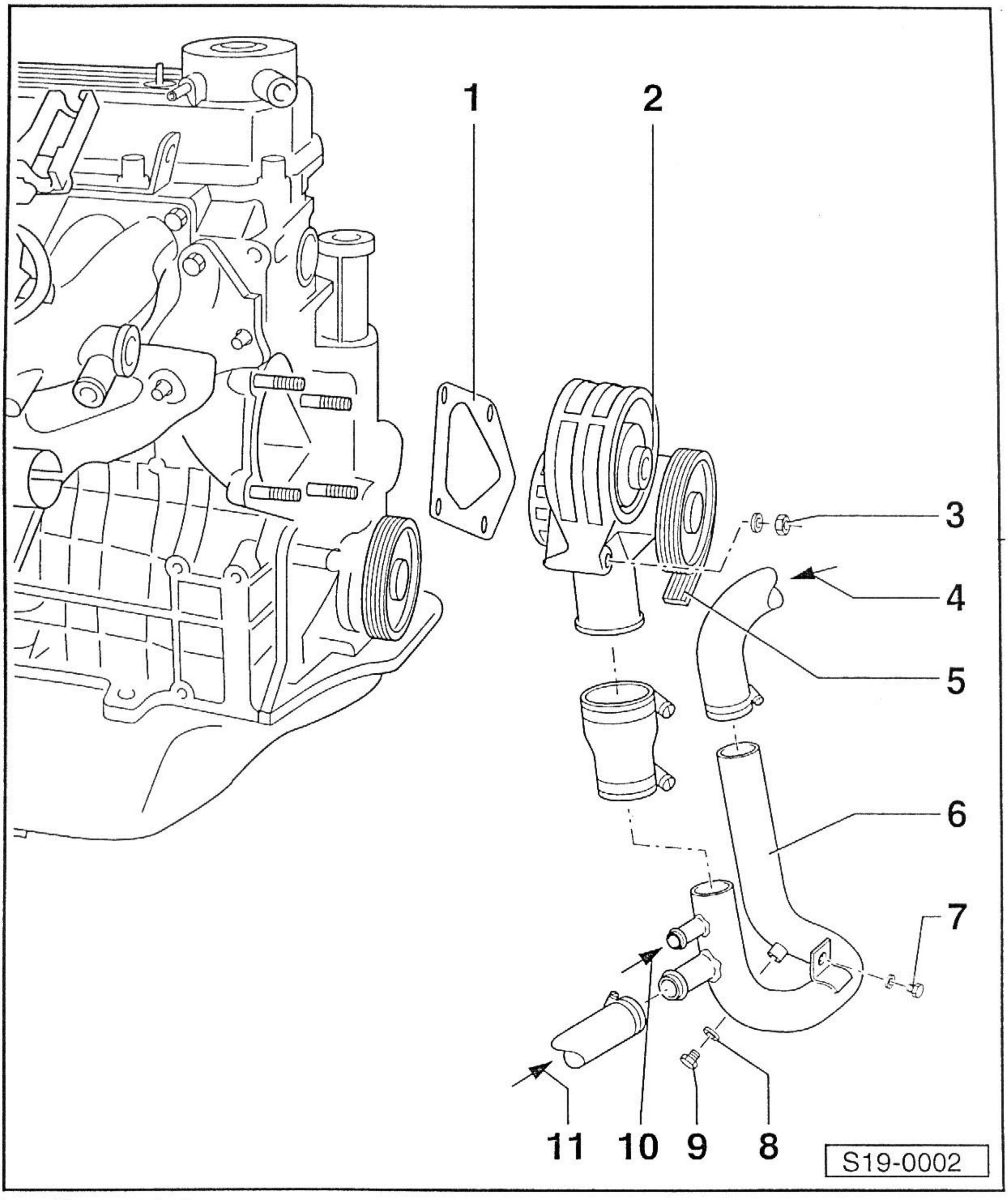
2 - **Coolant pump**
- ♦ Removing and installing ⇒ page 19-13
- ♦ Dismantling and assembling ⇒ page 19-15

3 - **Hexagon nut**
- ♦ 20 Nm

4 - **From bottom of radiator**
- ♦ ⇒ page 19-2, item 7

5 - **V-belt/ribbed V-belt**
- ♦ Removing and installing V-belt/ribbed V-belt
- ⇒ Inspection and Maintenance; Checking condition of V-belt/ribbed V-belt and checking tension of ribbed V-belt; tensioning if necessary

6 - **Coolant pipe**



7 - **Hexagon bolt**
- ♦ 10 Nm

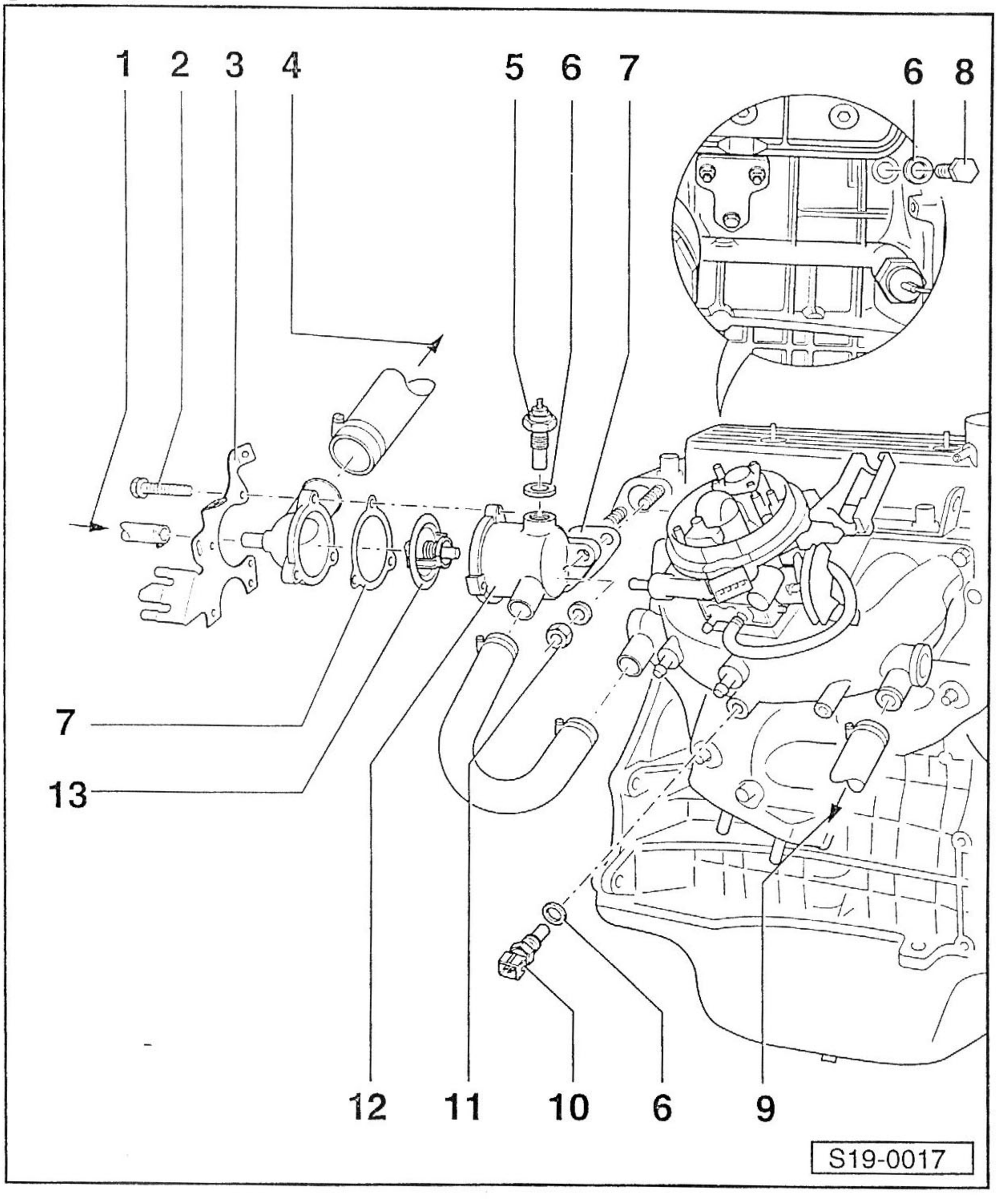
8 - **Seal**
- ♦ Replace

9 - **Drain plug**
- ♦ Insert with Loctite 511
- ♦ 20 Nm

10 - **From automatic choke**
- ♦ On models with carburetor engine

11 - **From heat exchanger**

Thermostat for models ➢ 02.96



Thermostat end

1 - From expansion reservoir
- ⇒ page 19-3, item 10

2 - Hexagon bolt
- 10 Nm

3 - Bracket

4 - To top of radiator
- ⇒ page 19-2, item 2

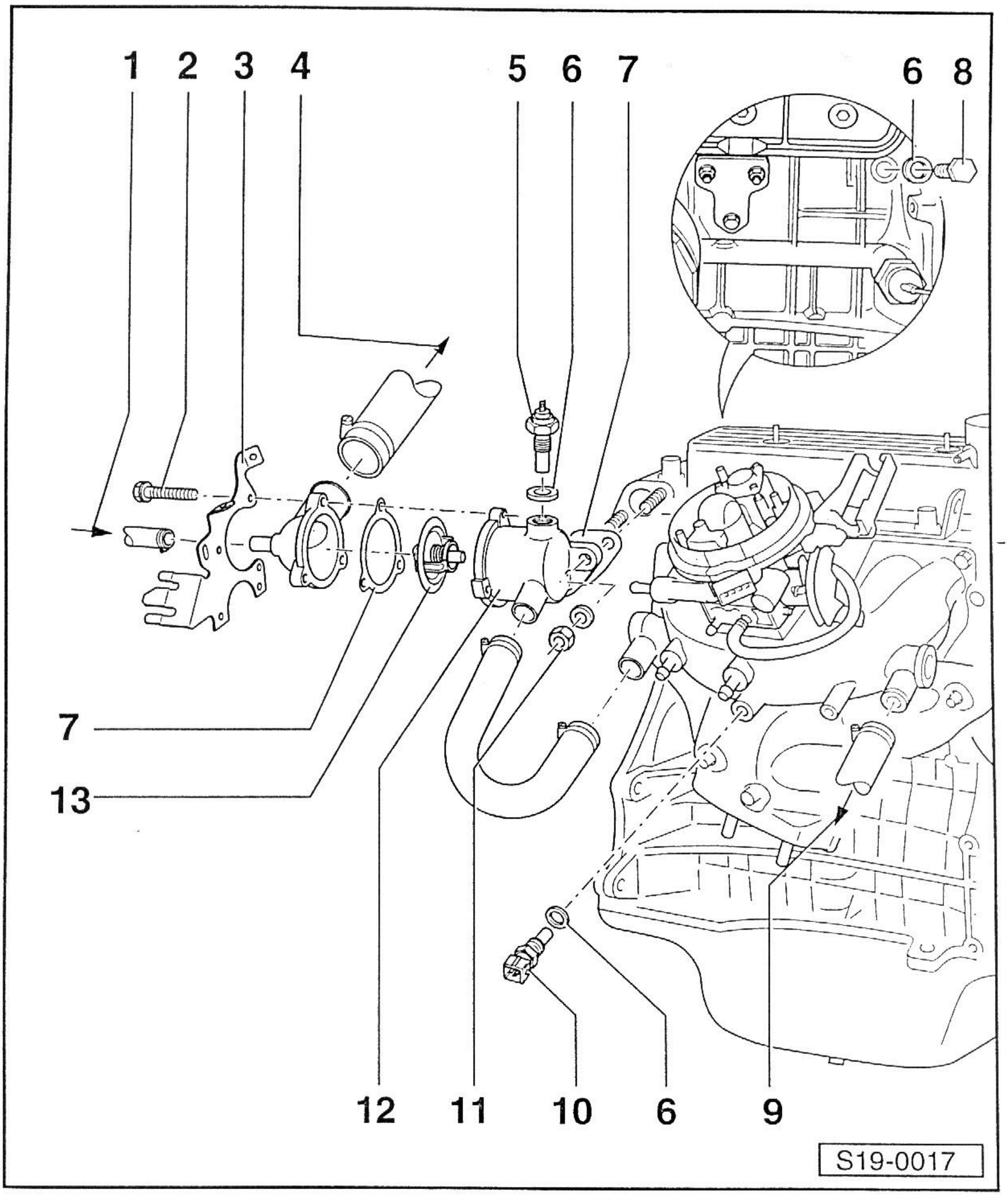
5 - Coolant temperature gauge sender (G2)

6 - Seal
- Replace

7 - Gasket
- Replace

8 - Drain plug
- Insert with Loctite 511
- 25 Nm

9 - To heat exchanger



10 - Coolant temperature sender (G62)
- For Mono-Motronic
- Testing

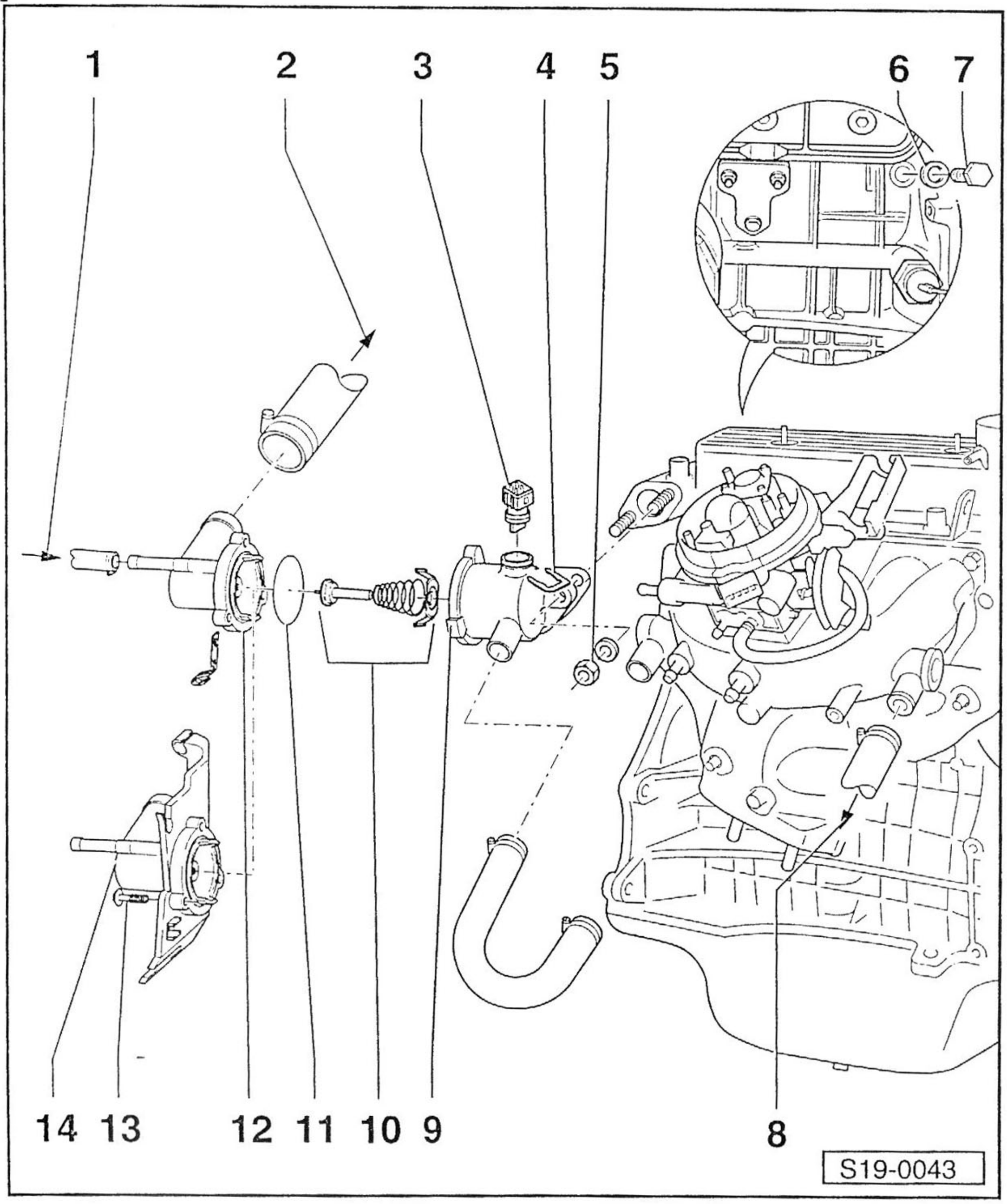
⇒ Repair Group 24; Mono-Motronic Fuel Injection and Ignition System

11 - Hexagon nut
- 20 Nm

12 - Thermostat housing

13 - Thermostat
- Testing: heat thermostat in water bath
- Start of opening about 88 °C
- End of opening about 103 °C
- Opening stroke about 8 mm

Thermostat for models 03.96 ➢



1 - From expansion reservoir
- ⇒ page 19-3, item 10

2 - To radiator
- ⇒ page 19-2, item 2

3 - Coolant temperature gauge sender (G62) and coolant temperature gauge sender (G2)
- Coloured marking ⇒ page 19-10

4 - Locking clip

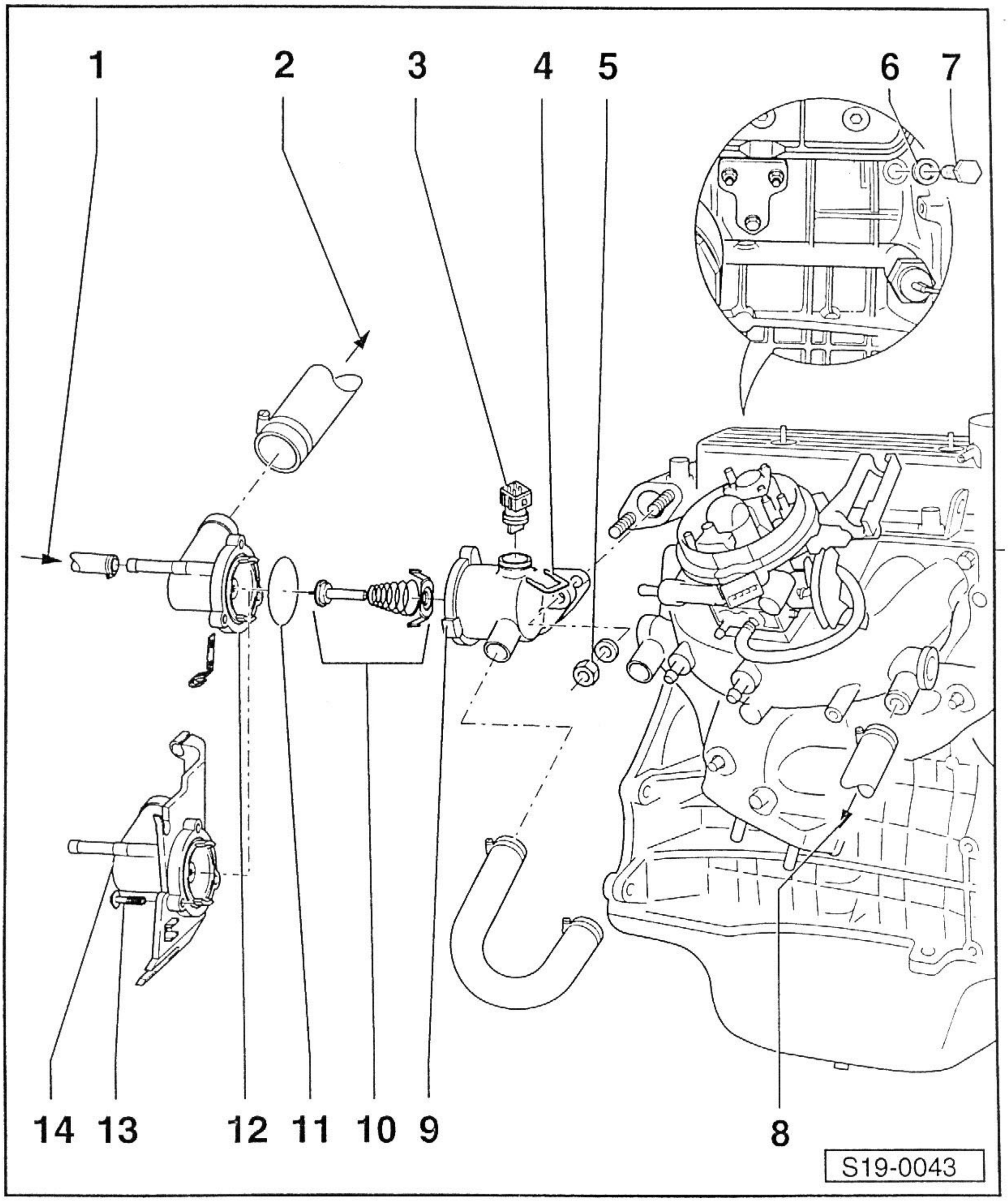
5 - 20 Nm

6 - Seal
- Replace

7 - Drain plug
- 25 Nm
- Insert with Loctite 511

8 - To heat exchanger

9 - Thermostat housing



10 - Thermostat
- Removing and installing: in cap of thermostat housing cover - item 12 (or item 14, respectively)
- Testing: heat cap of thermostat housing cover - item 12 (14) - with thermostat -item 10- installed in a water bath
- Start of opening 88 ± 2 °C
- End of opening about 103 °C
- Opening stroke 8 mm

11 - Seal
- Always replace

12 - Cap of thermostat housing cover
- Version for carburettor engine

13 - 9 Nm

14 - Cap of thermostat housing cover
- Version for fuel injection engines

Draining and pouring in coolant

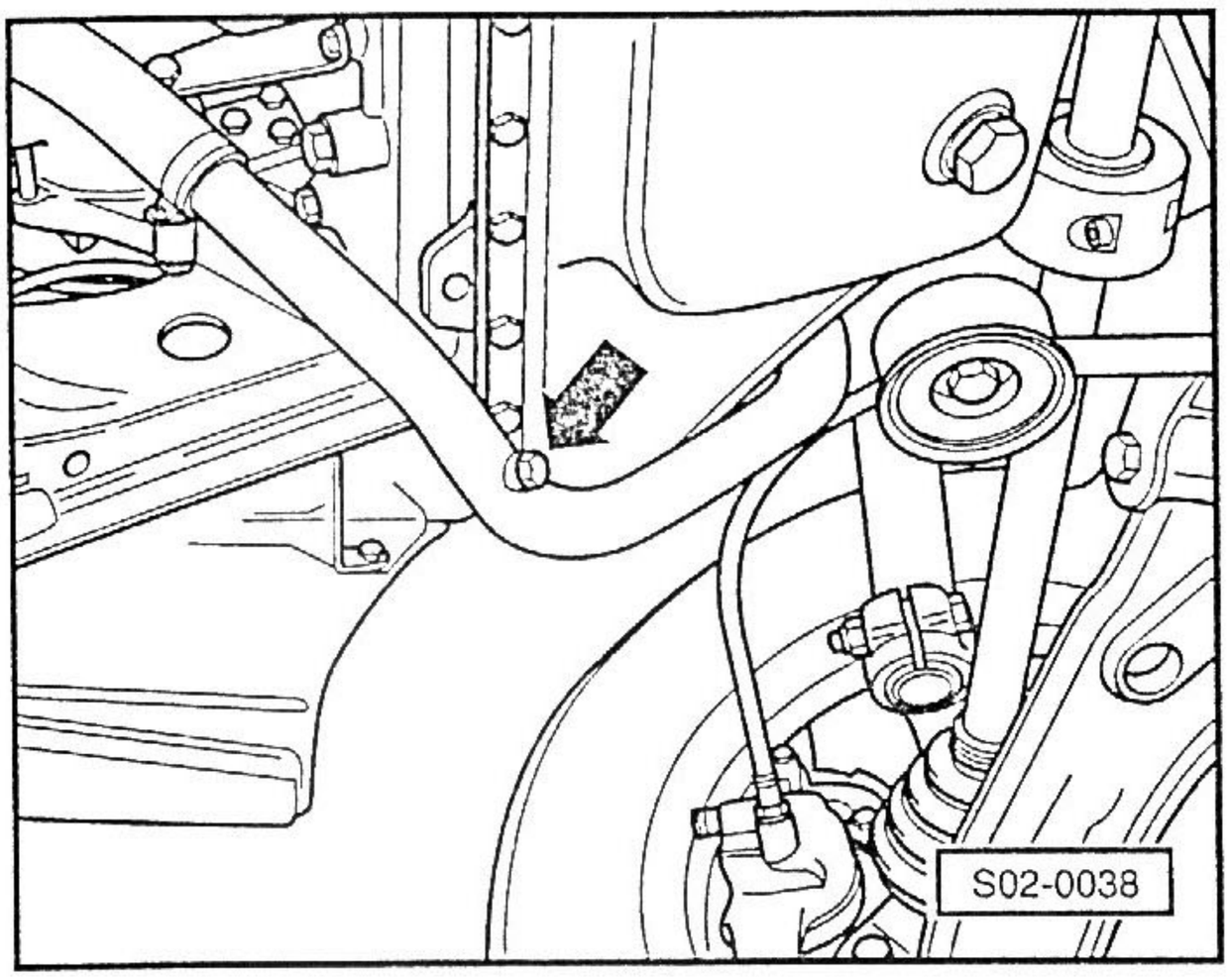
Note:

Pay attention to safety precautions
⇒ page 19-1.

Special tools, testers and aids required

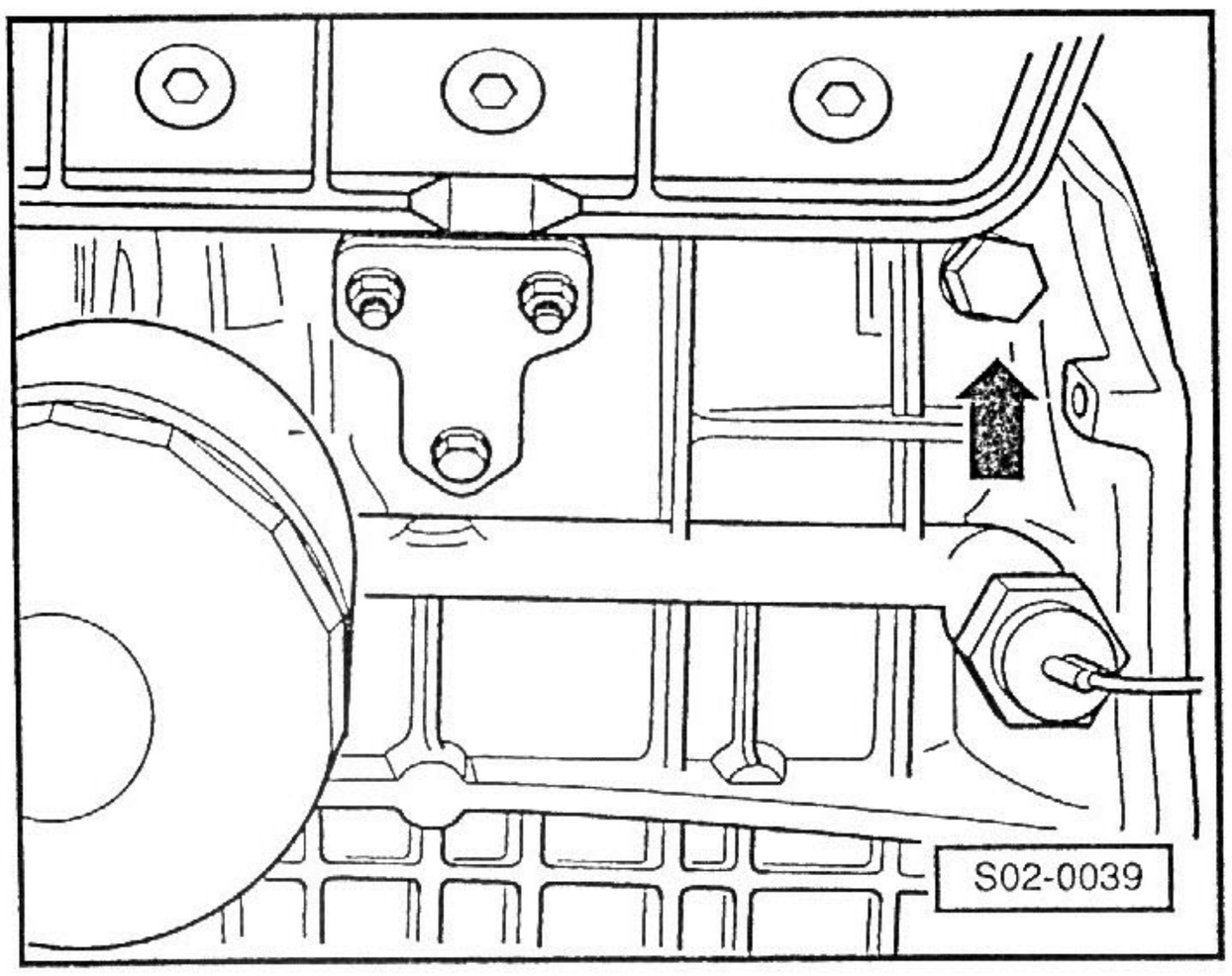
- Torque wrench e.g. V.A.G 1331 (5...50 Nm)
- Sealing compound e.g. Loctite 511

Draining



– Open cap of the coolant expansion tank.

◀ – Unscrew drain plug at coolant pipe below the coolant pump.



◀ – Unscrew drain plug at the cylinder block above the oil pressure switch.

– Collect coolant which flows out.

– Please pay attention to the instructions for disposing of coolant.

Pouring in coolant

– Screw in drain plug at cylinder block with Loctite 511 and new seal and tighten to
25 Nm.

– Screw in drain plug at coolant pipe with Loctite 511 and new seal and tighten to
20 Nm.

Notes:

- *The cooling system is filled all year round with a mixture of water and antifreeze/anticorrosion agent. Coolant additives marked „conforming to TL VW 774 B or C" prevent frost and corrosion damage, the formation of scale and in addition increase the boiling temperature of the coolant. For these reasons, the cooling system should always be filled all year round with antifreeze and anticorrosion agent. As a result of the higher boiling point, the coolant contributes to the operational reliability of the engine at high loads, particularly in countries with a tropical climate.*
- *If the radiator, heat exchanger, cylinder block, cylinder head or cylinder head gasket have been replaced, do not re-use the coolant which was in the system. Used coolant does not have a sufficient concentration of corrosion protection agent to create an adequate protective layer on large, newly installed components.*

For all models ➤ 07.96

Coolant additives complying with TL-VW 774 B

Coolant additive	Manufacturer
Fridex D 824 HS	Velvana Velvary
Glysantin G 05-25	BASF AG
Glycoshell AF 511 S	Dt. Shell Chemie GmbH
Antifreeze D 824 HS	DOW Chemical GmbH
Genantin LP 1864/2	Höchst AG
BP Napgel C2220 (X139B)	BP Chemicals
Fridiol Extra	Agrimex Třebíč

For models 08.96 ➤

Coolant additives complying with TL-VW 774 C

Coolant additive	Manufacturer
Glysantin with Protect Plus	BASF
see Catalogue of original accessories	Velvana Velvary

For all models

Note:

The coolant additives listed above can be intermixed.

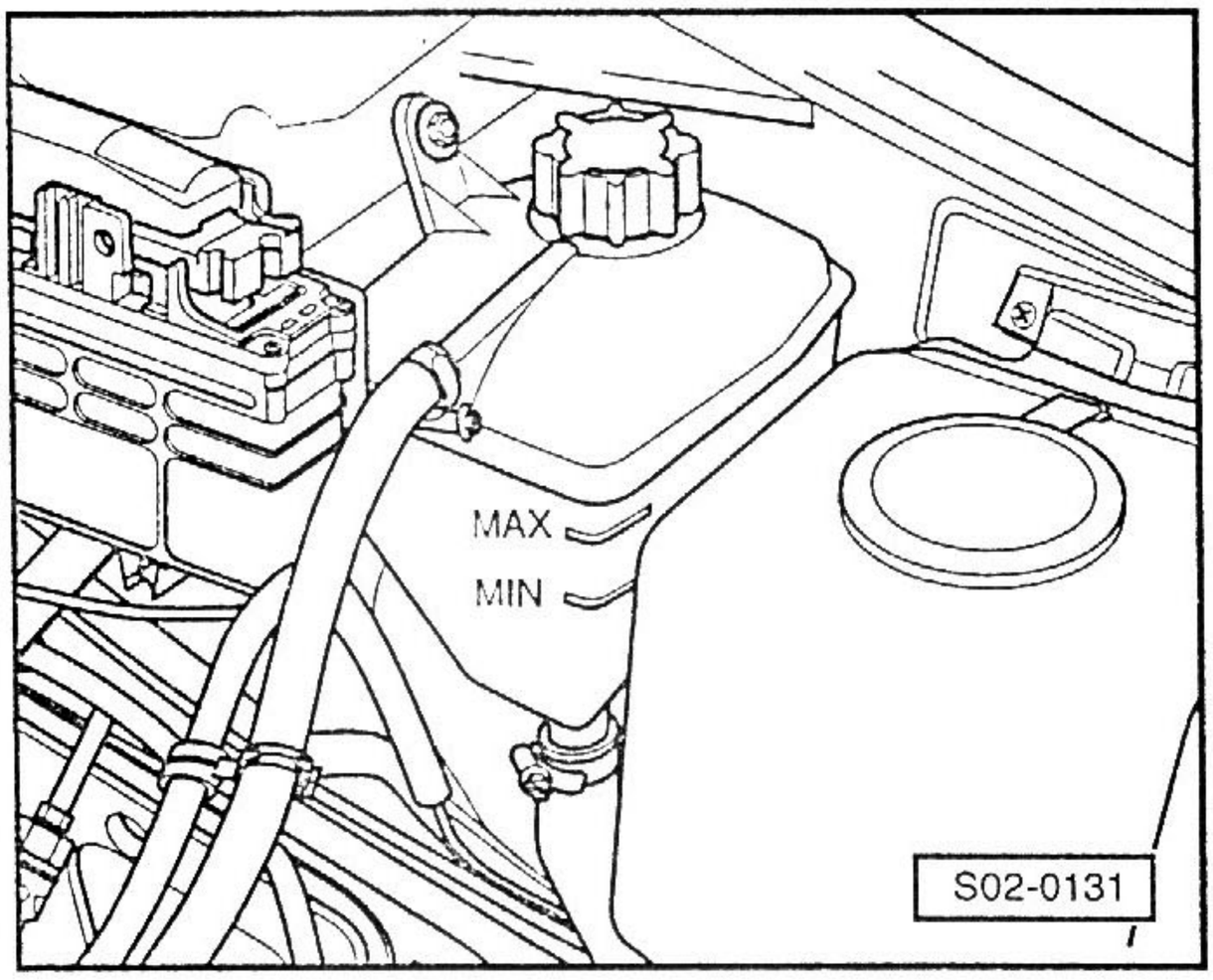
Recommended mixing ratios:

Antifreeze protection down to	Coolant additive [1]	Water
- 25 °C	40%	60%
- 35 °C	50%	50%

[1] If greater antifreeze protection is required for climatic reasons, the concentration of coolant additive can be increased, but only up to 60 % (antifreeze protection down to about -40°C) otherwise the antifreeze protection is again reduced and the cooling efficiency is also impaired.

The cooling system has a capacity of about 5.6 litres.

Models ➢ 02.96



◀ - Slowly pour in coolant up to the max. marking on the expansion reservoir.

- Close expansion reservoir.

- Run engine until the radiator fan cuts in.

- Check coolant level and top up, if necessary.

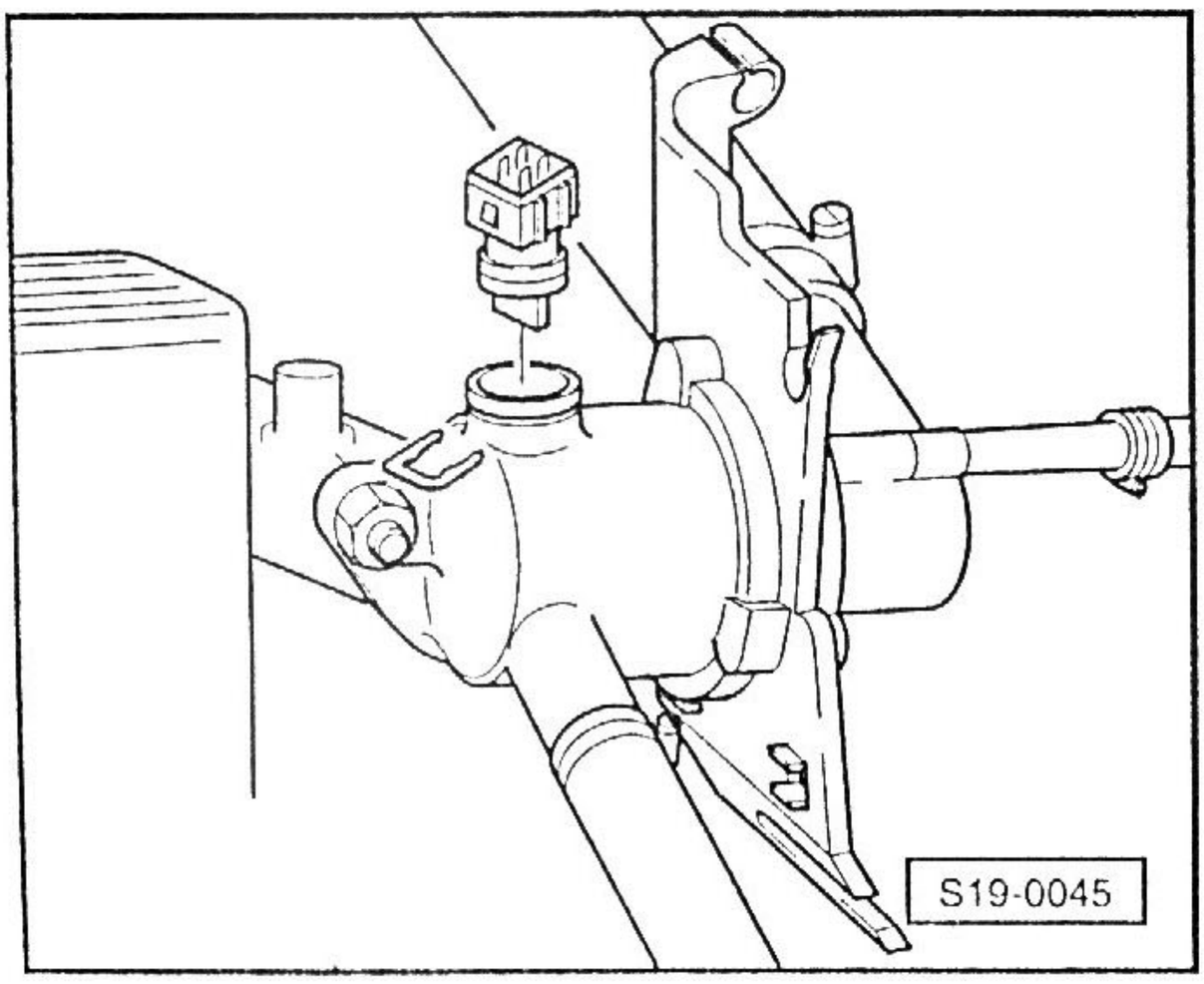
Note:

If the engine is at normal operating temperature, the coolant level should be at the max. marking; if the engine is cold, it should be between the min. and max. markings.

Models 03.96 ➢

Note:

If the filling method described below is not observed, the cooling system is not filled complete with coolant and there is a risk of engine damage.



- Remove the plastic plug of the coolant temperature sender on the coolant thermostat housing.

◀ - Remove coolant temperature sender.

- Continue pouring coolant into the system until the coolant appears in the connection fitting for the coolant temperature sender.

- Install coolant temperature sender and attach with plastic plug.

- Run engine until fan cuts in.

- Top up level in the expansion reservoir to the max. marking.

Types of coolant temperature senders:

Engine version	Designation of sender and coolant thermostat housing
Mono-Motronic	yellow/211.6
Carburettor	yellow/212.6
Mono-Motronic with air conditioning	blue/214.6
Carburettor with air conditioning	blue/215.6

Leak test of cooling system

Special tools, testers and aids required

- Cooling system tester e.g. LR 150/98

Test procedure

- Mount cooling system tester onto the expansion reservoir.

- Operate the priming pump of the tester to produce a pressure of about 1.1 bar.

- If the pressure drops, locate the leakage point and rectify.

Testing antifreeze concentration

Note:

Pay attention to safety precautions
⇒ page 19-1.

Special tools, testers and aids required

♦ Antifreeze tester DUO-CHECK 7182

Testing concentration of coolant additive

– Use e.g. antifreeze tester DUO-CHECK 7182 for checking the antifreeze protection.

– Extract a little coolant with the pipette and apply to the measuring prism. Hold the instrument against a light source and read off the temperature down to which antifreeze protection exists on the right-hand scale.

♦ Antifreeze protection must be assured down to about -25°C.

♦ In countries with an arctic climate down to about -35°C.

Note:

If a greater antifreeze protection is required for climatic reasons, the antifreeze concentration may be increased, but only up to 60 %, i.e. antifreeze protection down to approx. -40 °C otherwise the antifreeze protection will again be reduced and the cooling efficiency will also be impaired.

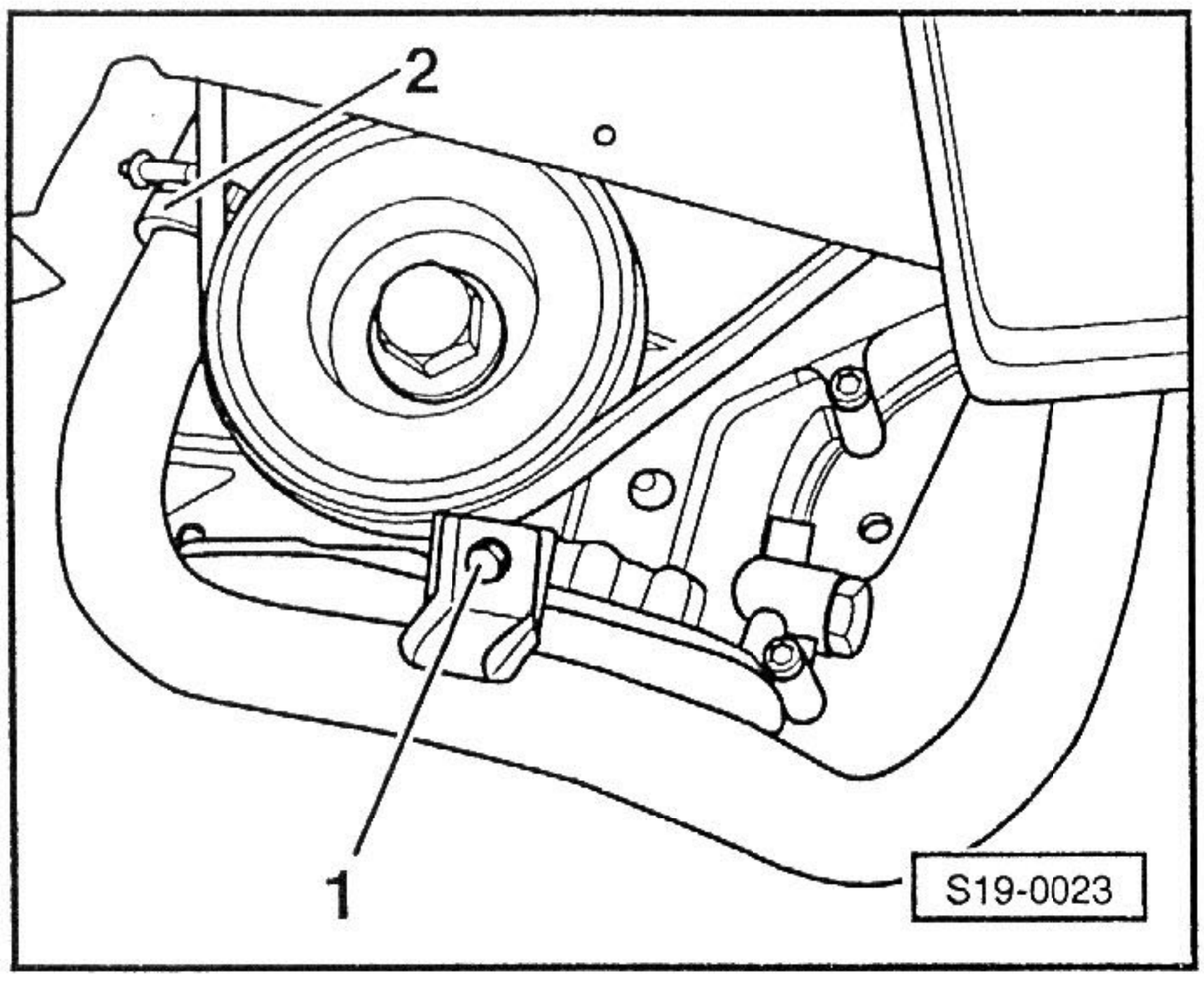
– If the antifreeze protection available is not adequate, drain part of the coolant and add coolant of the recommended mixing ratio to the system ⇒ page 19-8, Draining and pouring in coolant.

Removing and installing coolant pump

Special tools, testers and aids required

- Lifting device MP 9-502/1
- Removing and insertion device MP 8-516

Removing



– Remove air filter and resonator (if fitted).
⇒ Repair Group 24; Mono-Motronic Fuel Injection and Ignition System; Servicing injection part

– Remove engine compartment cover and cover for V-belt/ribbed V-belt.

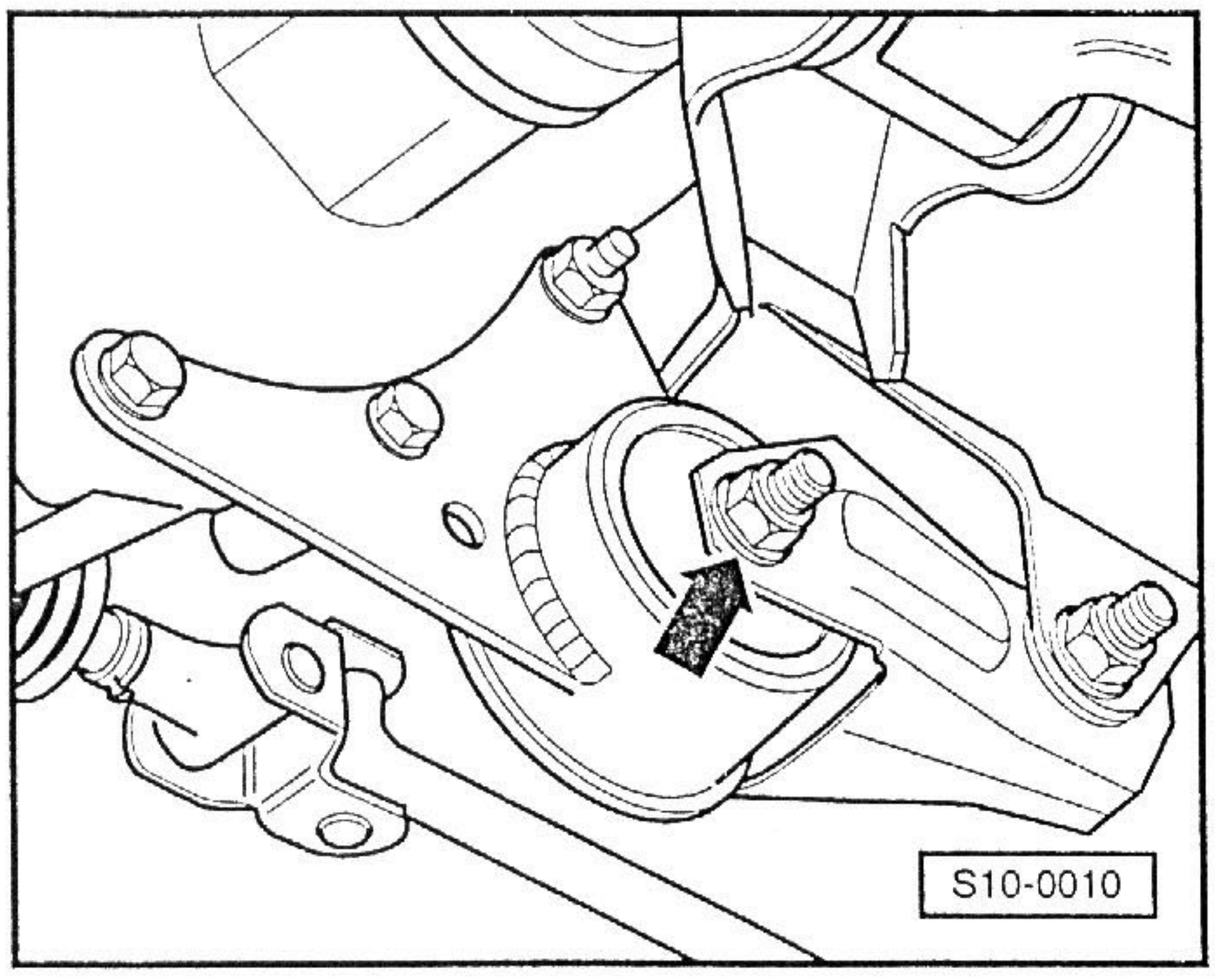
– Drain coolant ⇒ page 19-8.

◀ – Unscrew bolt for securing coolant pipe -1- to the cylinder block.

– Detach hose -2- at the coolant pump.

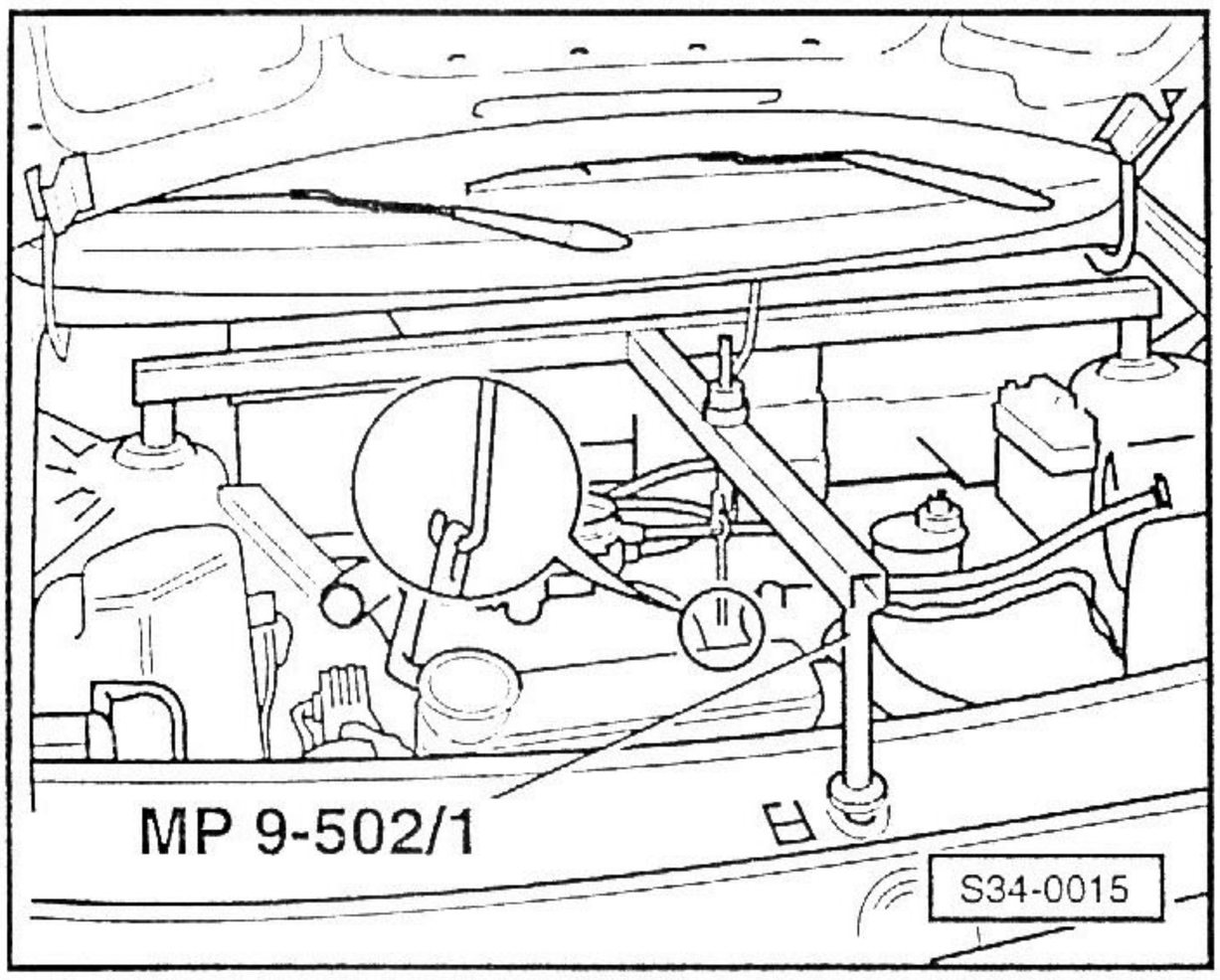
– Unbolt shift support at the gearbox.

– Remove pin of shift rod using the removing and insertion device MP 8-516 and pull shift rod off gearbox.
⇒ 5-Speed Manual Gearbox; Repair Group 34; Removing and installing gearbox



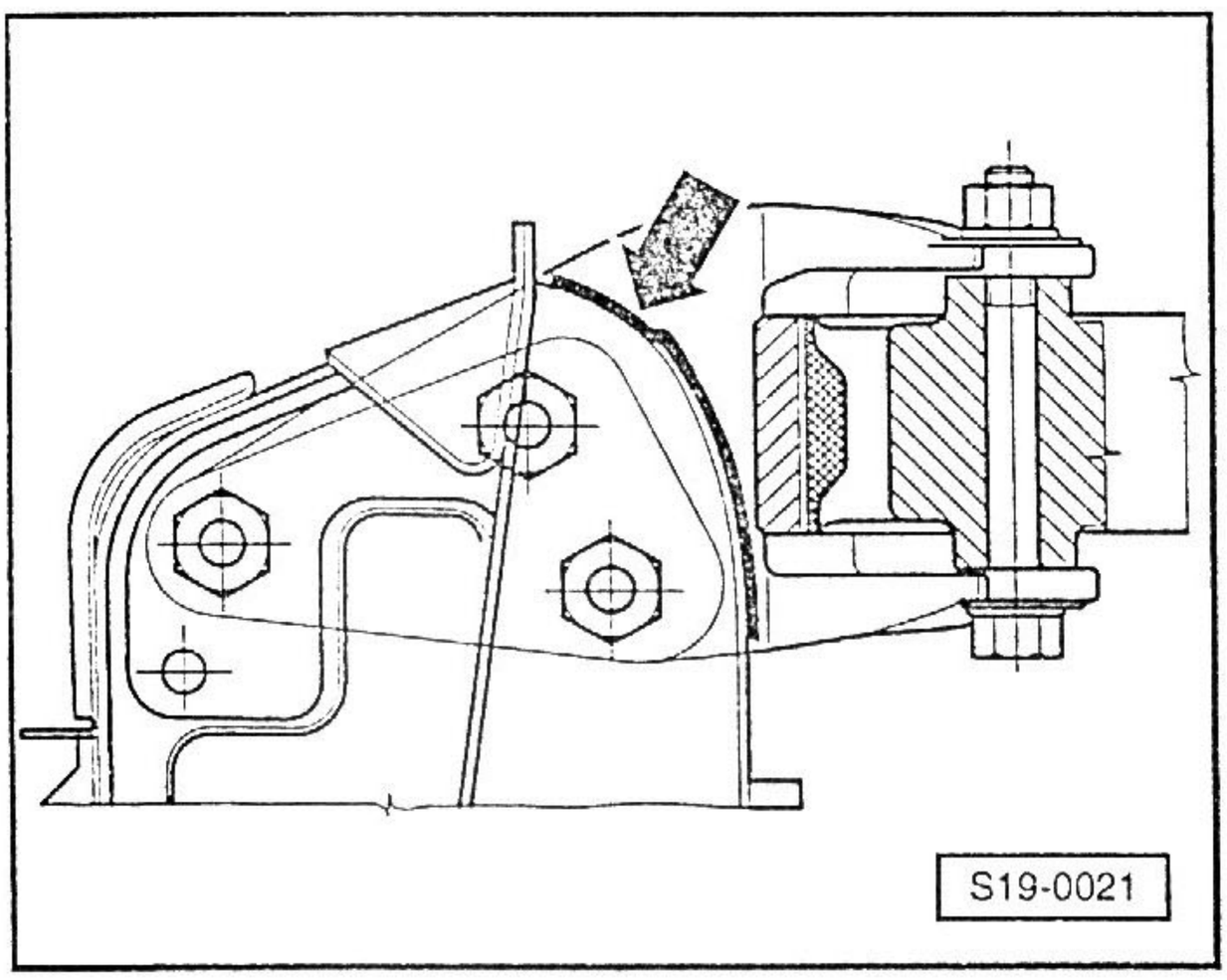
◀ – Remove bolt from the pendulum support.

– Remove V-belt/ribbed V-belt.
⇒ Inspection and Maintenance; Checking condition of V-belt/ribbed V-belt and checking tension of ribbed V-belt; tensioning if necessary

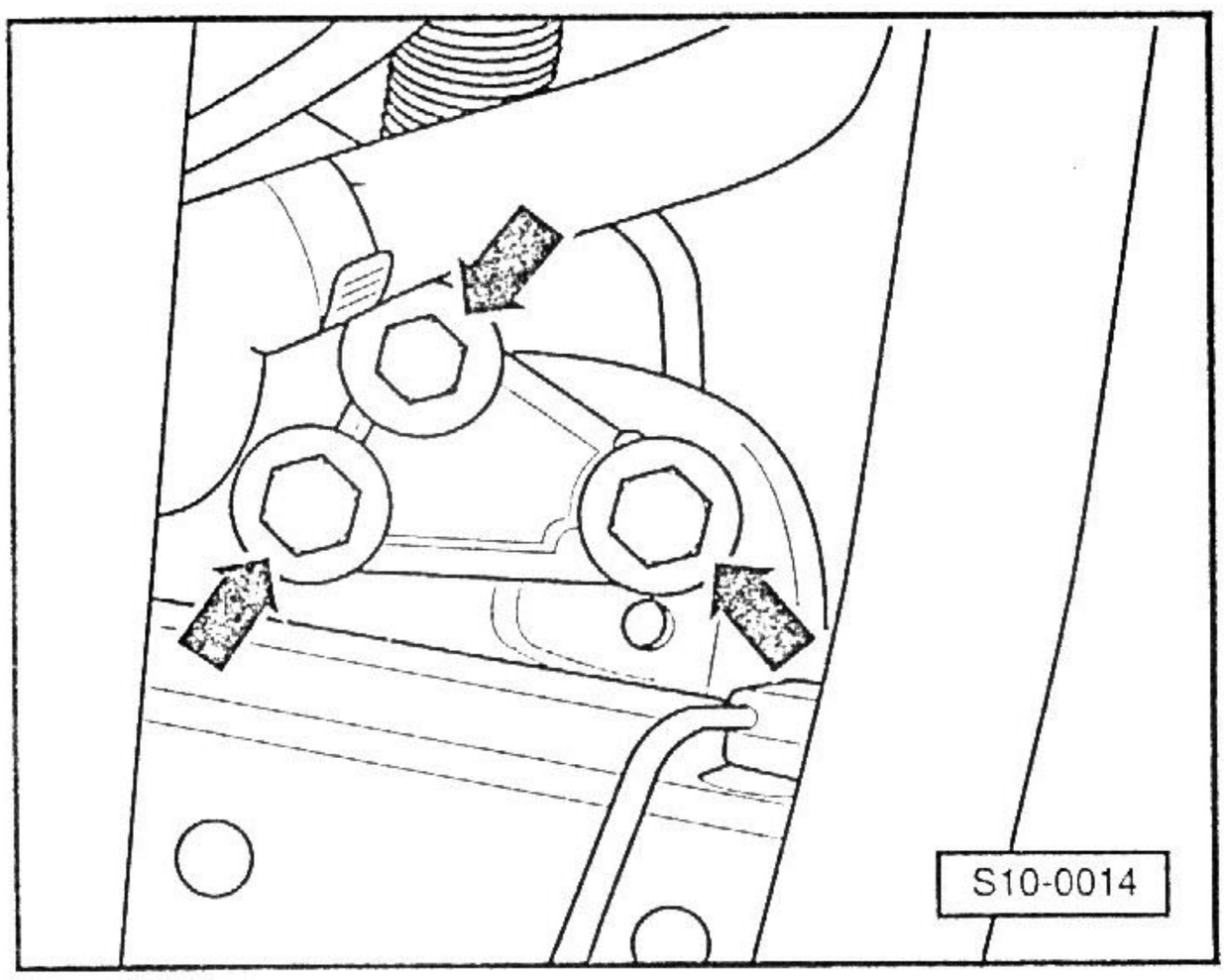


◀ – Fit on lifting device MP 9-502/1.

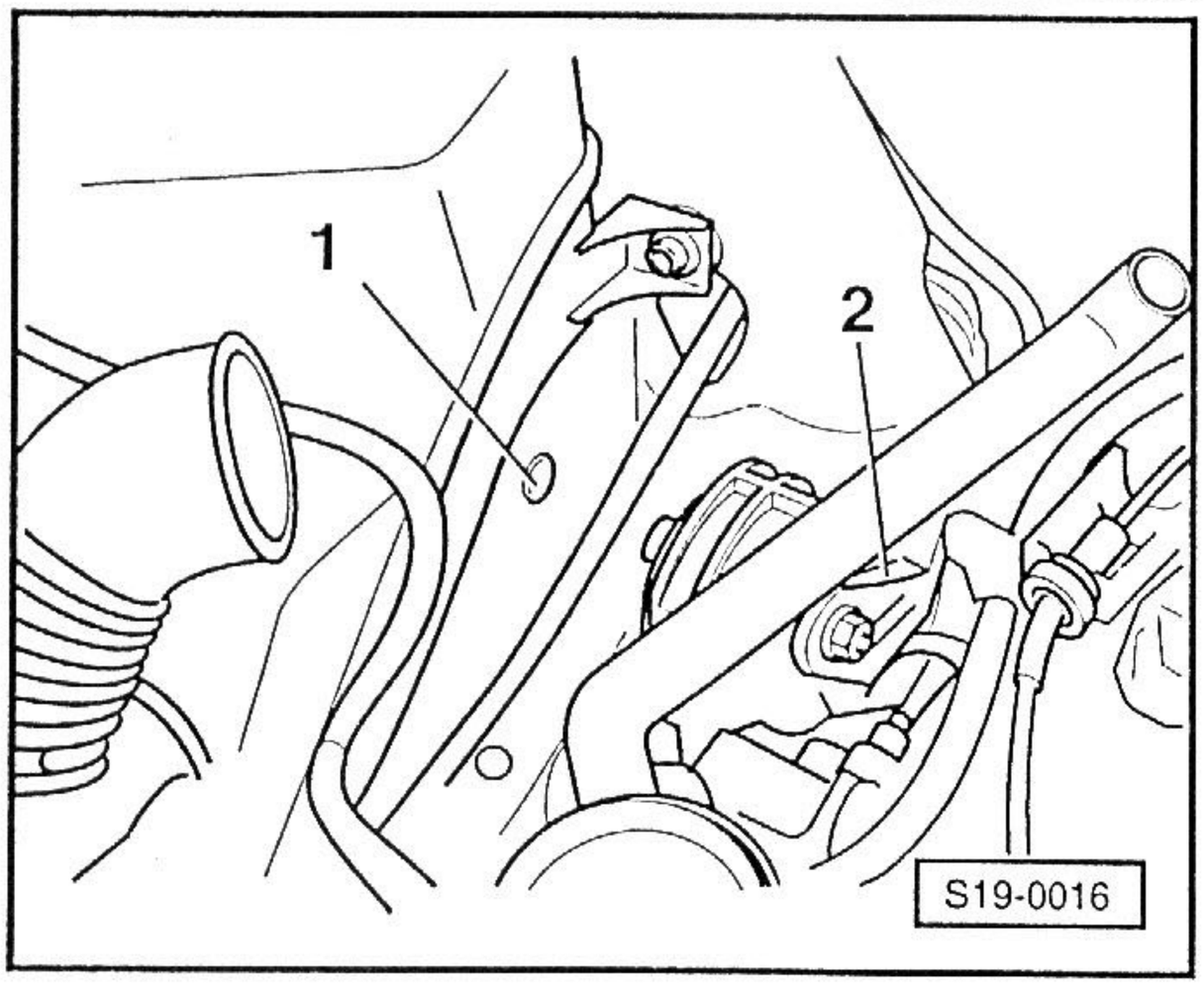
– Insert lifting device into lifting eye at the cylinder head and take up weight of engine.



◀ – Mark position of the engine bracket.



◀ – Unscrew the securing bolts of the engine bracket -arrows- at the body.



◀ – Lever out plug -1- working from the wheel-house end.

– Remove engine mount -2-.

– Unscrew securing nuts of the coolant pump.

– Lift engine sufficiently until it is possible to pull the coolant pump off the stud bolts.

Installing

Installation is performed in the reverse order; pay attention to the following points:

– Insert coolant pump with new gasket.

– Pay attention to marking when installing the engine bracket.

– Insert new plug, if necessary.

– Install pin of the shift rod.
⇒ 5-Speed Manual Gearbox; Repair Group 34; Removing and installing gearbox

– Install air filter and resonator.
⇒ Repair Group 24; Mono-Motronic Fuel Injection and Ignition System; Servicing injection part

– Remove V-belt/ribbed V-belt.
⇒ Inspection and Maintenance; Checking condition of V-belt/ribbed V-belt and checking tension of ribbed V-belt; tensioning if necessary

– Pour in coolant ⇒ page 19-8.

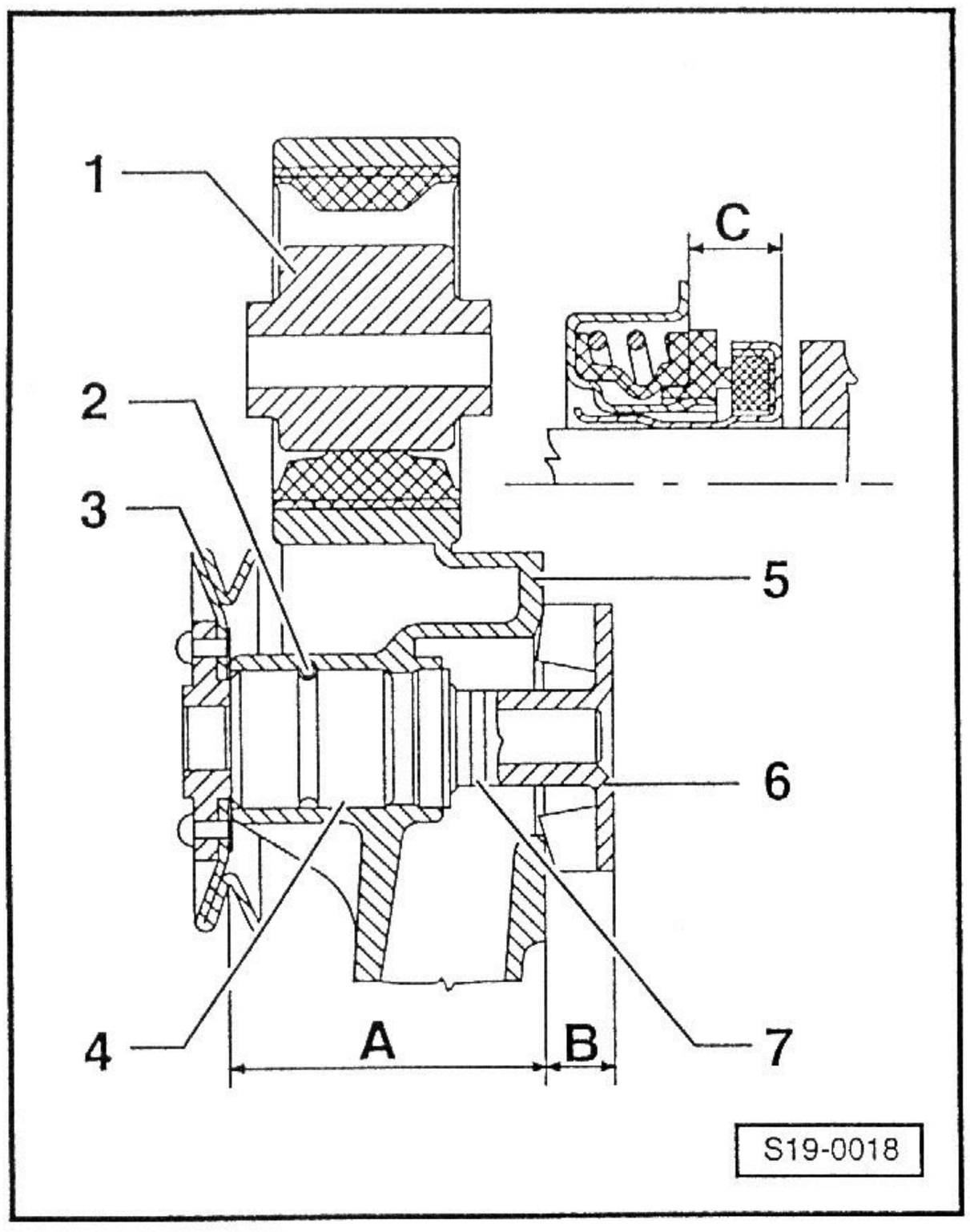
Tightening torques

Bolted connection	Tightening torque
Coolant pump to cylinder block	20 Nm
Engine mount to body	55 Nm
Engine mount to coolant pump	50 Nm
Securing bolt of coolant pipe	10 Nm

Dismantling and assembling coolant pump

Special tools, testers and aids required

- Torque wrench V.A.G 1331 (5...50 Nm)
- Installation device MP 1-501
- Bolt MP 1-501/1
- Shims MP 1-501/2
- Washer MP 1-601/3
- Washer MP 1-501/8
- Supporting washer MP 1-501/4
- Supporting bush MP 1-501/5
- Insert MP 1-501/6
- Collar ring MP 1-501/7
- Ring MP 1-501/9
- Extractor MP 1-502
- Insertion drift MP 1-503
- Extractor MP 3-509



◀ **Components and installation sizes of the coolant pump**

1 - Bonded rubber bush

2 - 5x36 roll pin

3 - Belt pulley

4 - Bearing

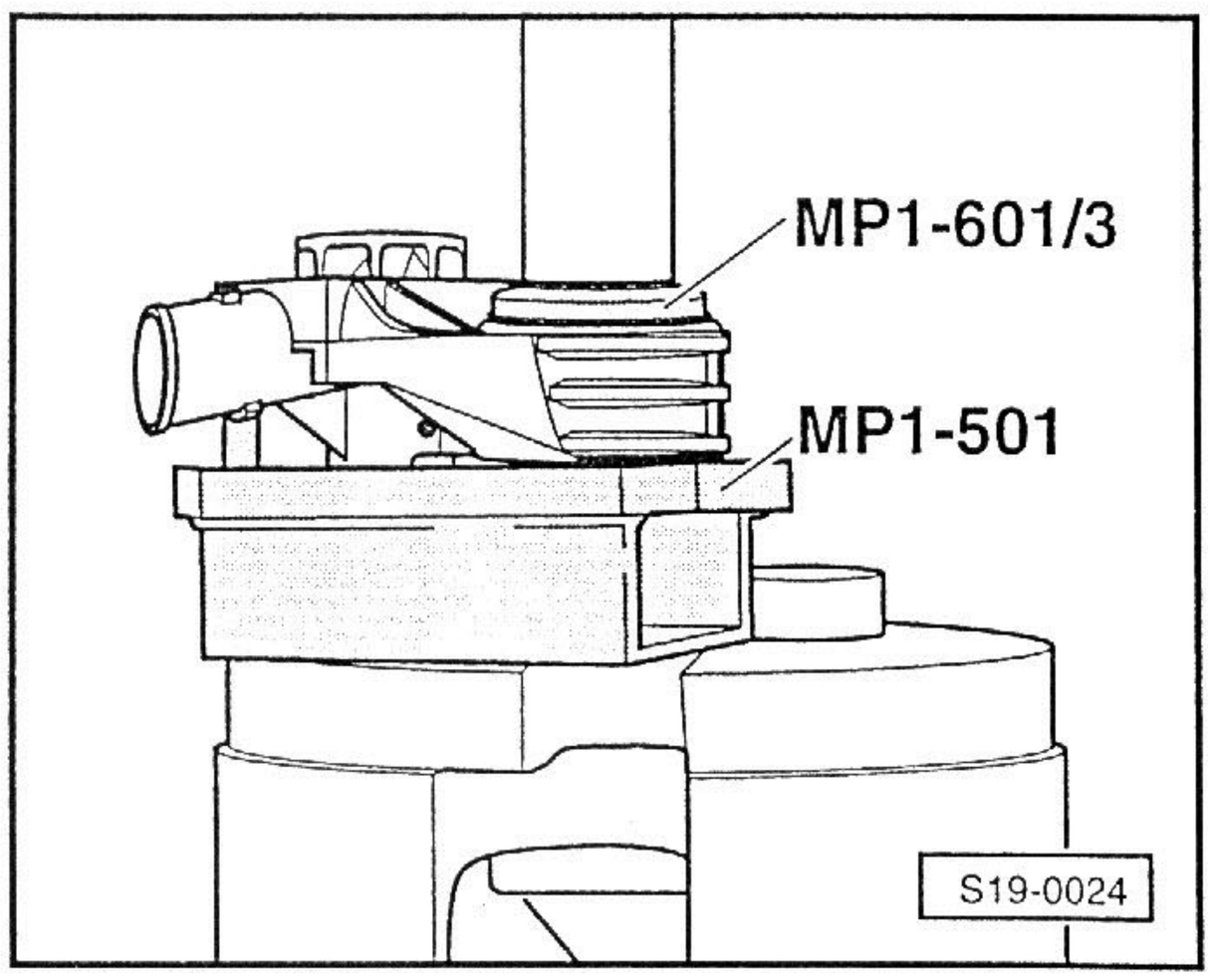
5 - Coolant pump housing

6 - Vane

7 - Axial seal

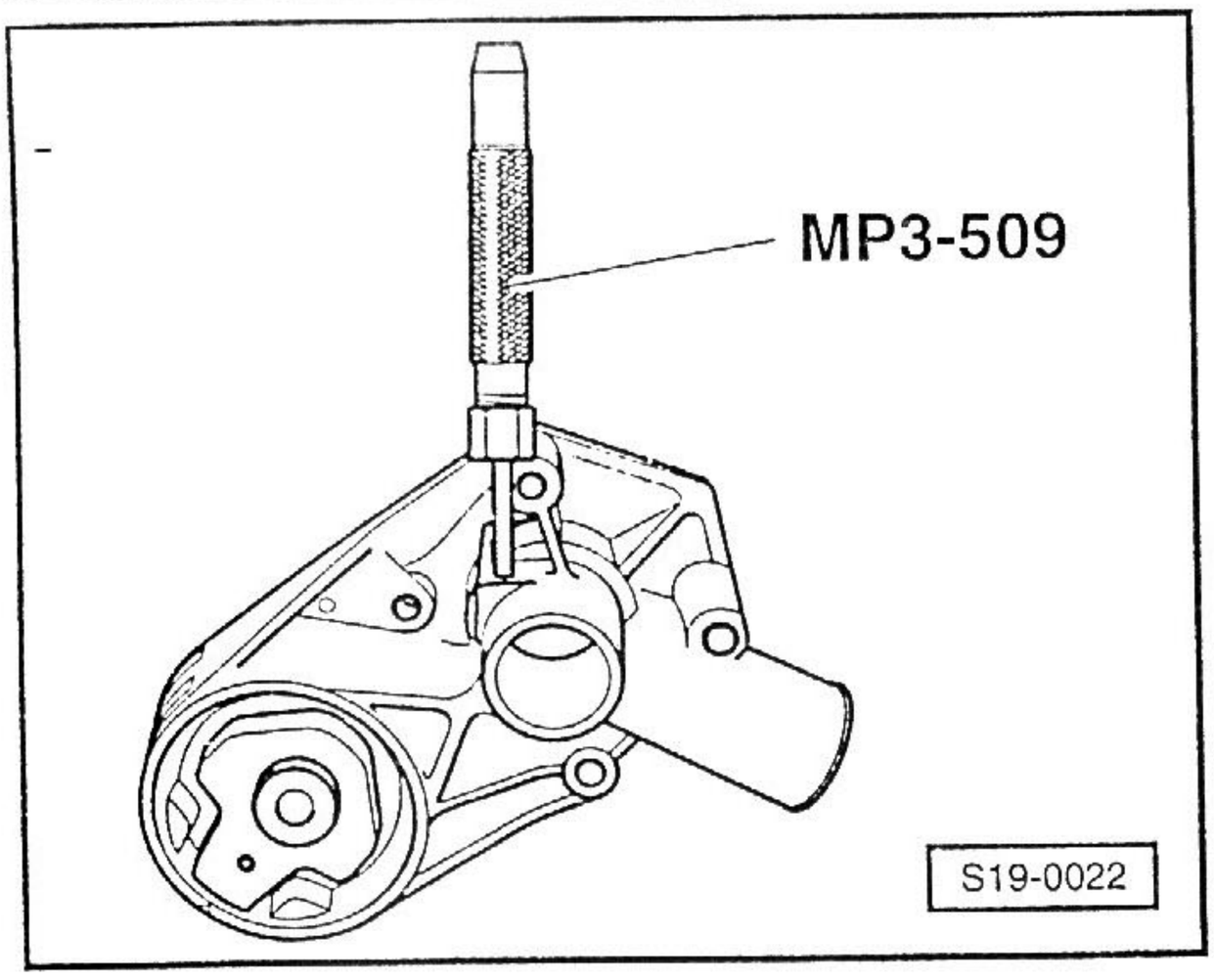
Size	Manufacturer of axial seal	
	Simrax A x 10 k - 12 E04[1)2)]	Crane 106 C[3)]
A	73.2...73.8 mm	73.2...73.8 mm
B	19.3...19.4 mm	19.3...19.4 mm
C	9.3...9.9 mm	10.32...10.48 mm

1) Recognizable externally from additional sealing varnish on outer diameter
2) Insert with insertion drift MP 1-503/1
3) Insert with insertion drift MP 1-503/2

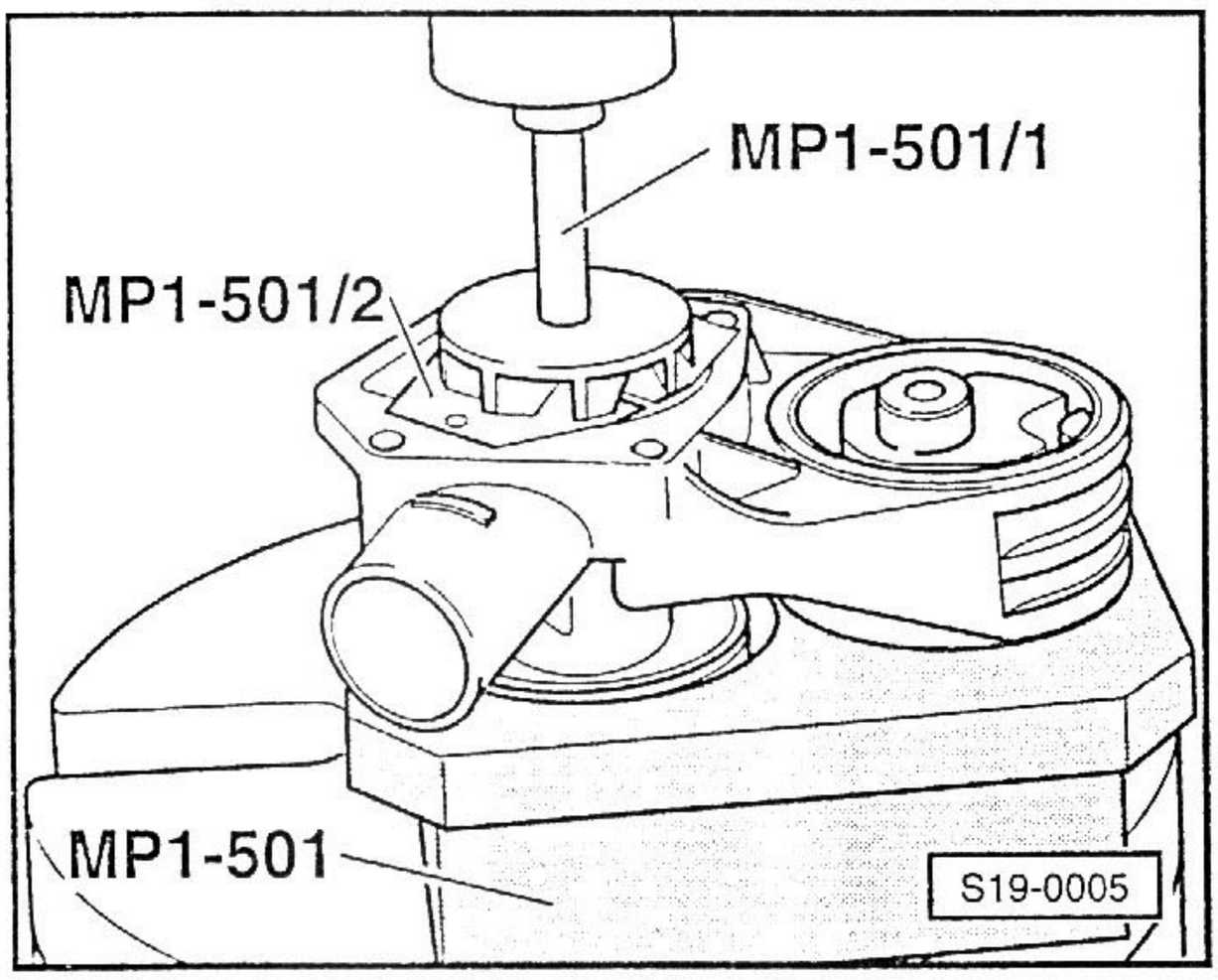


Dismantling

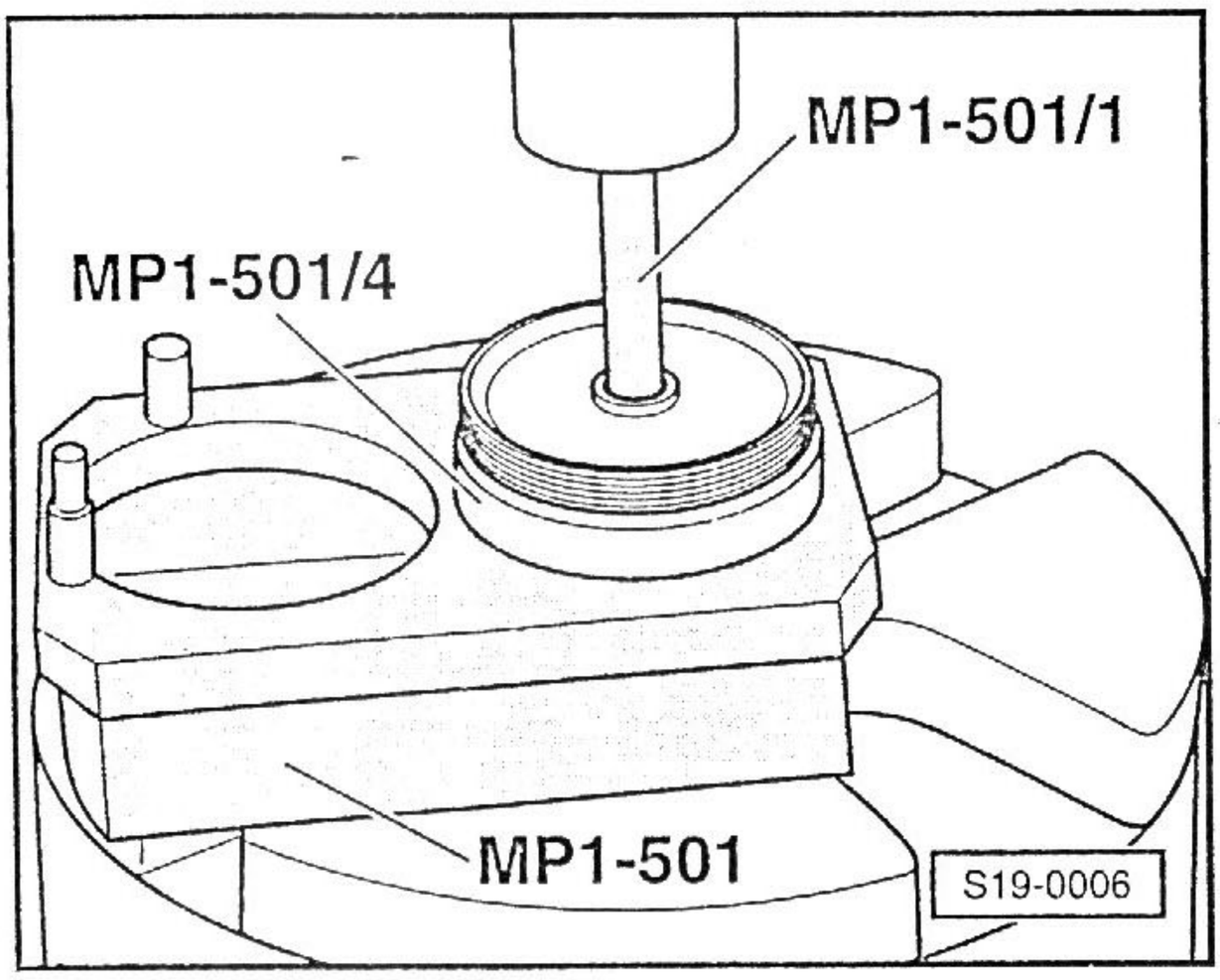
◀ – Use assembly device MP 1-501 and washer MP 1-601/3 to press out bonded rubber bush.



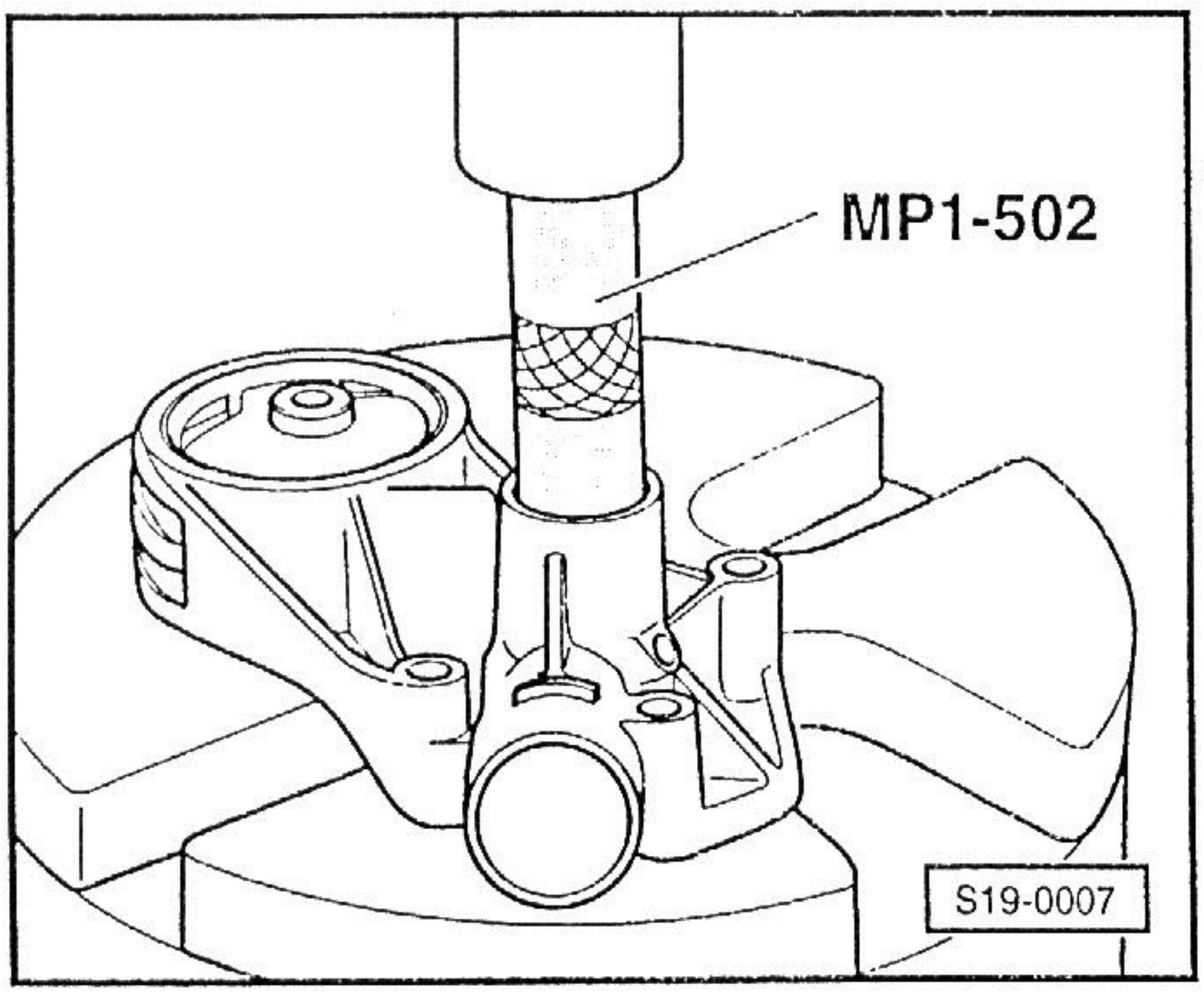
◀ – Use extractor MP 3-509 to knock out roll pin.



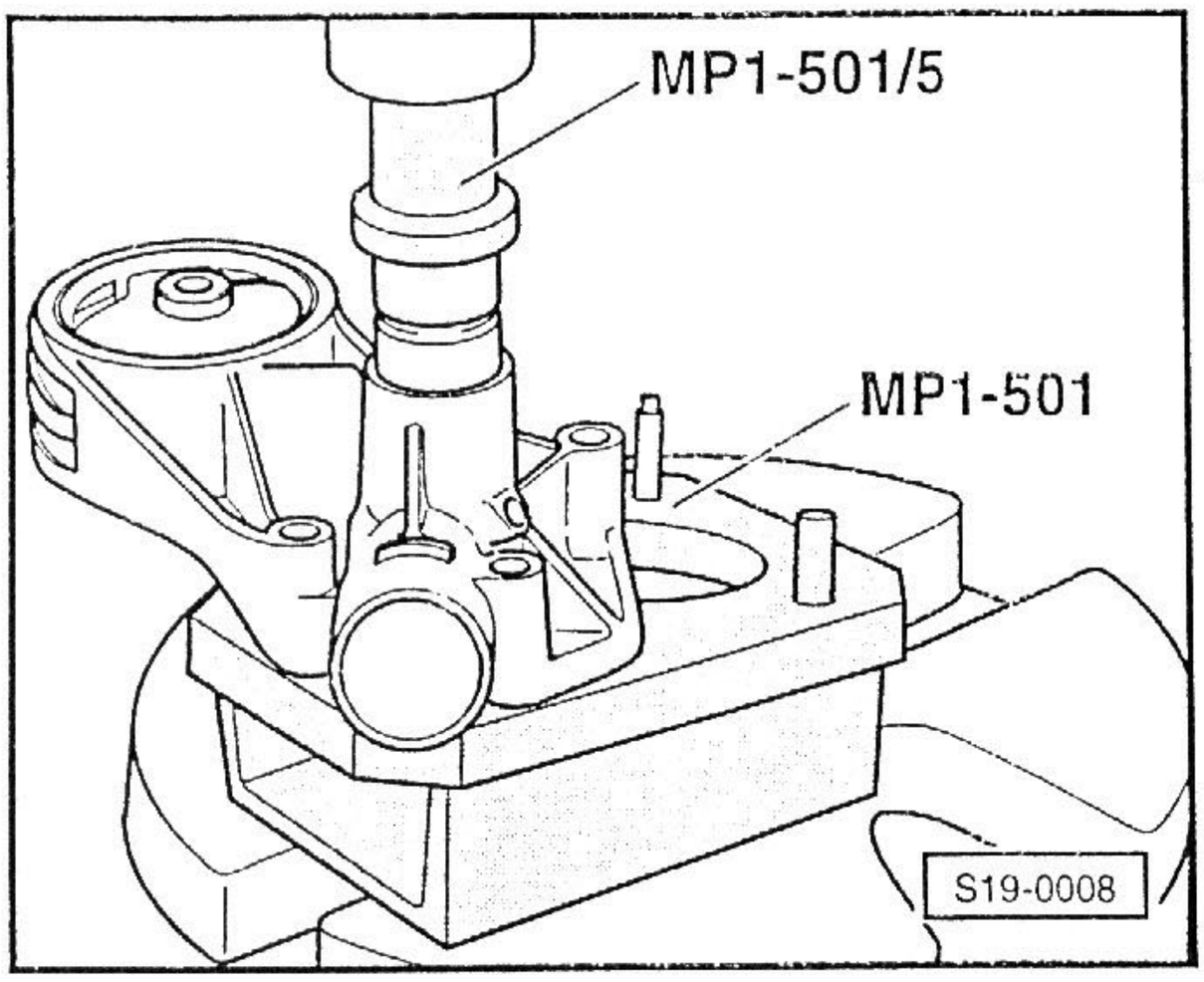
◀ – Use assembly device MP 1-501, shims MP 1-501/2 and bolt MP 1-501/1 to press out vane and bearing.



◀ – Use assembly device MP 1-501, supporting washer MP 1-501/4 and bolt MP 1-501/1 to press off belt pulley.

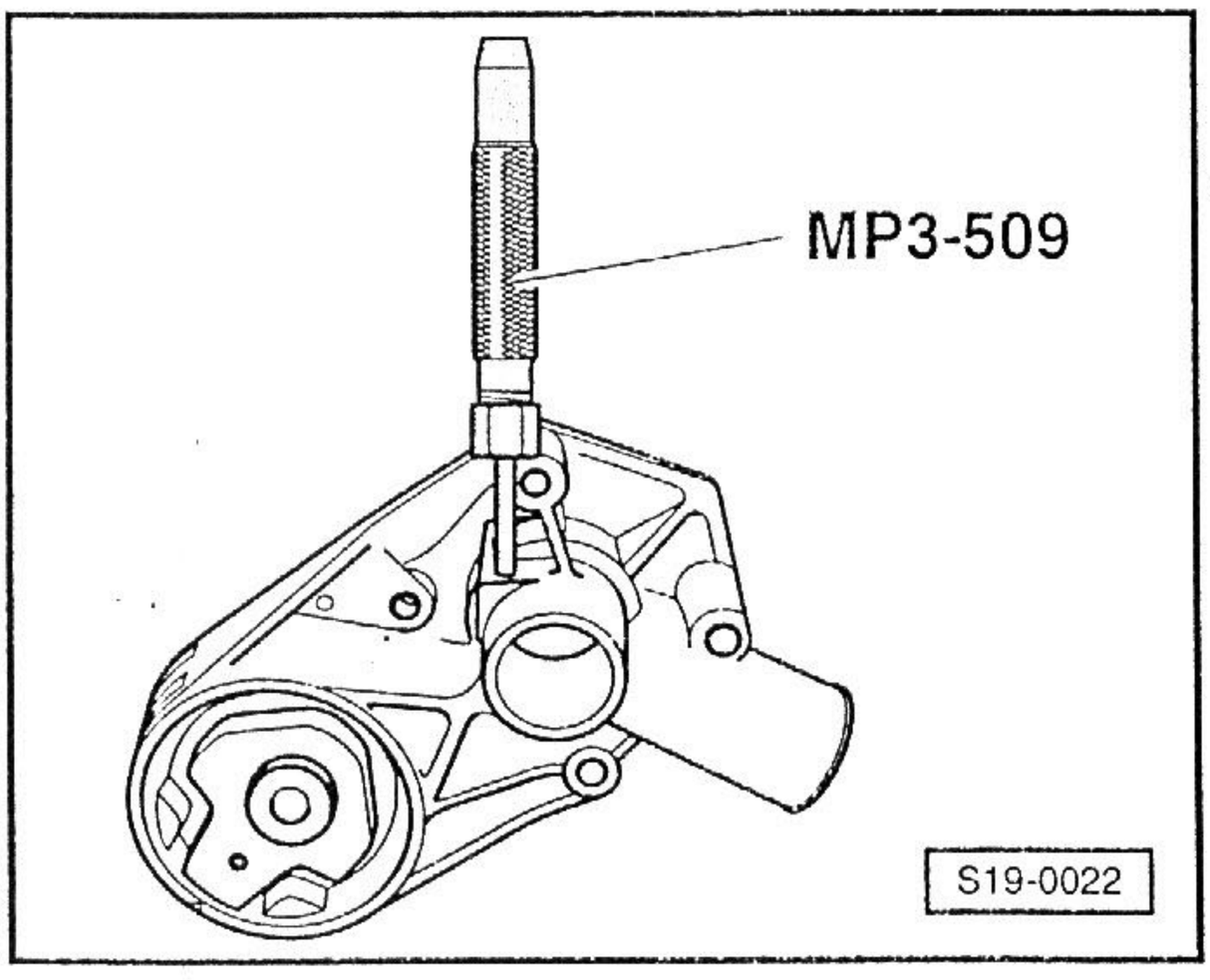


◀ – Use extractor MP 1-502 to press out axial seal.

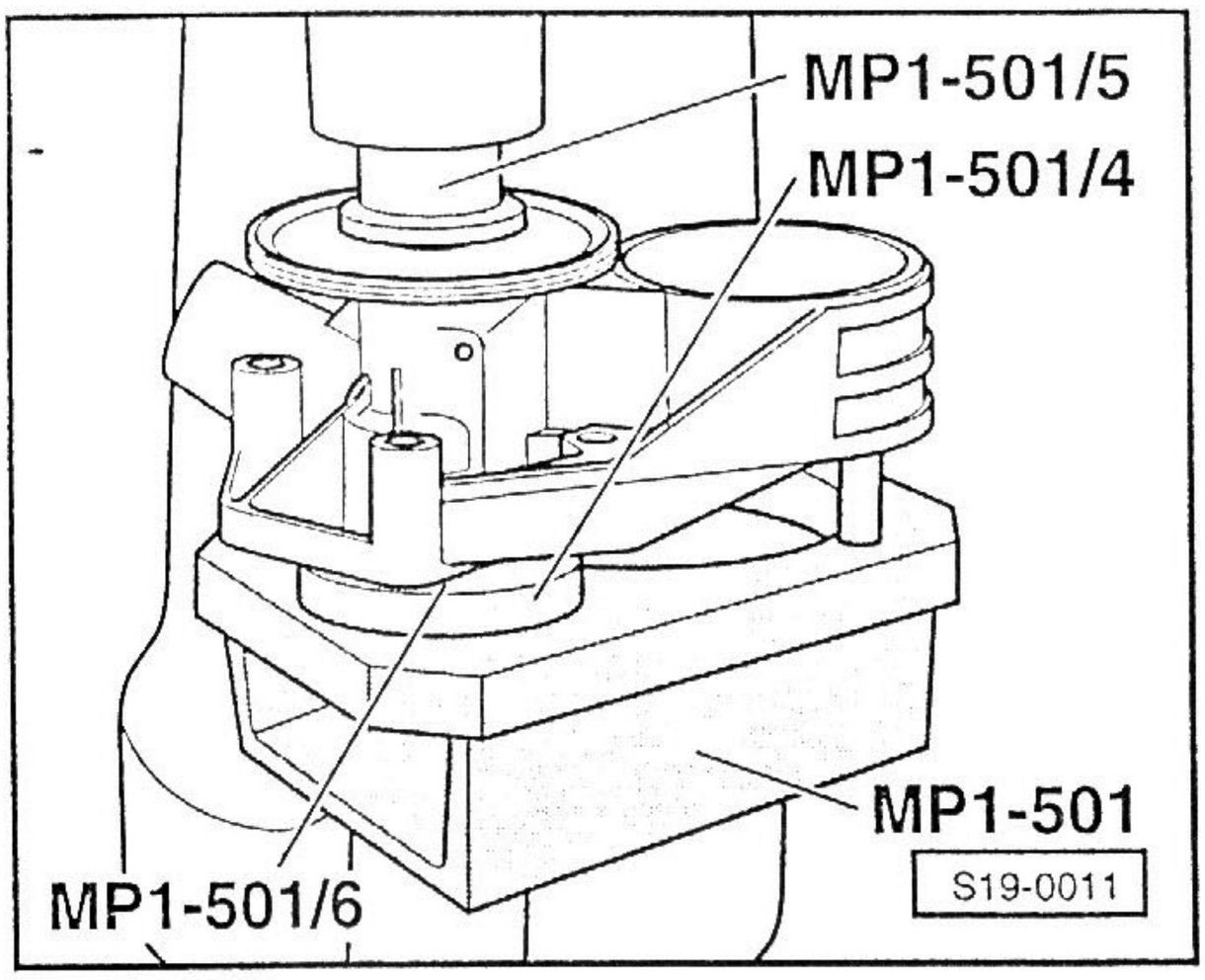


Assembling

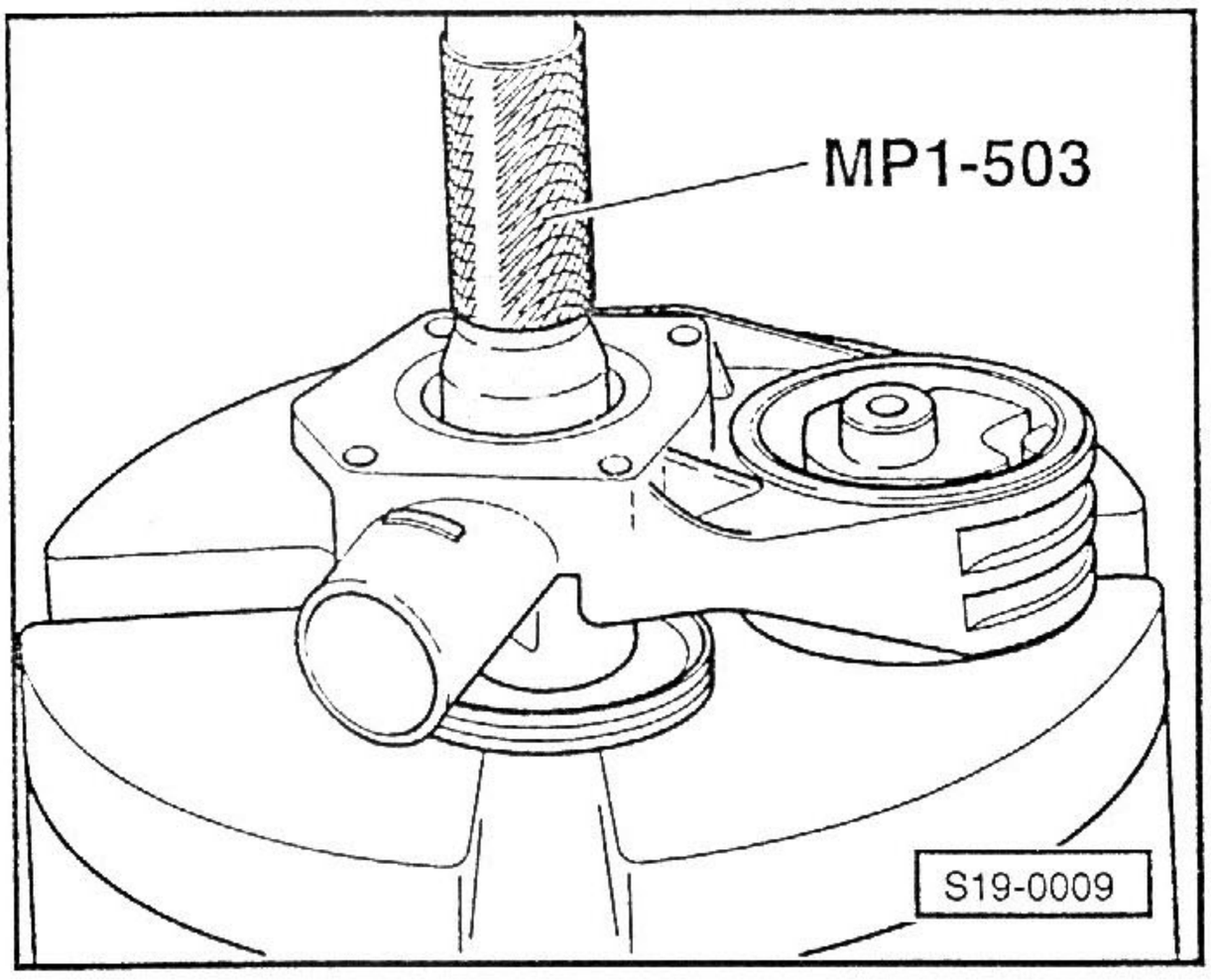
◀ – Use assembly device MP 1-501 and supporting bush MP 1-501/5 to press in bearing.



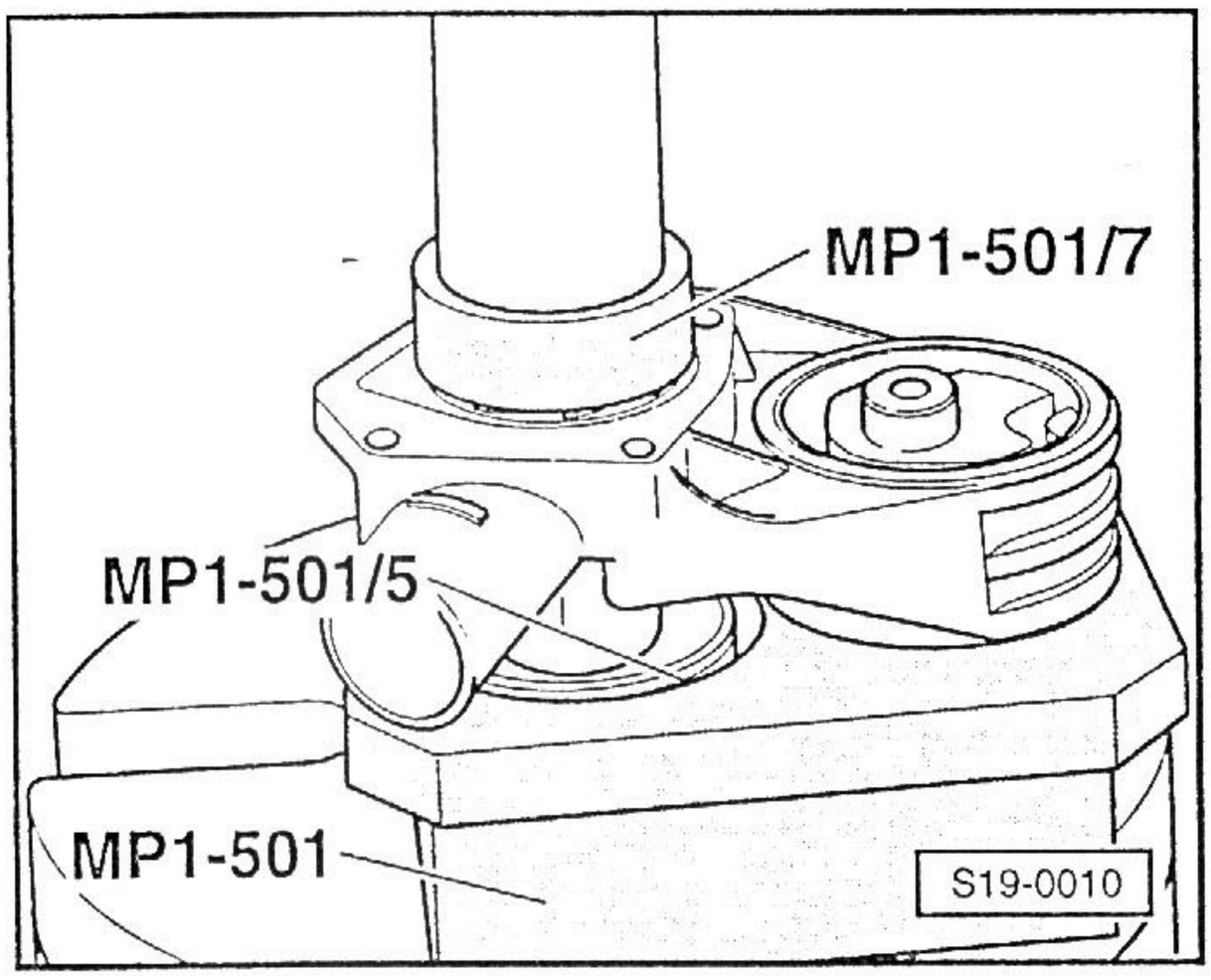
◀ – Use extractor MP 3-509 to knock in new roll pin.



◄– Use assembly device MP 1-501, supporting washer MP 1-501/4, supporting bush MP 1-501/5 and insert MP 1-501/6 to press in belt pulley.



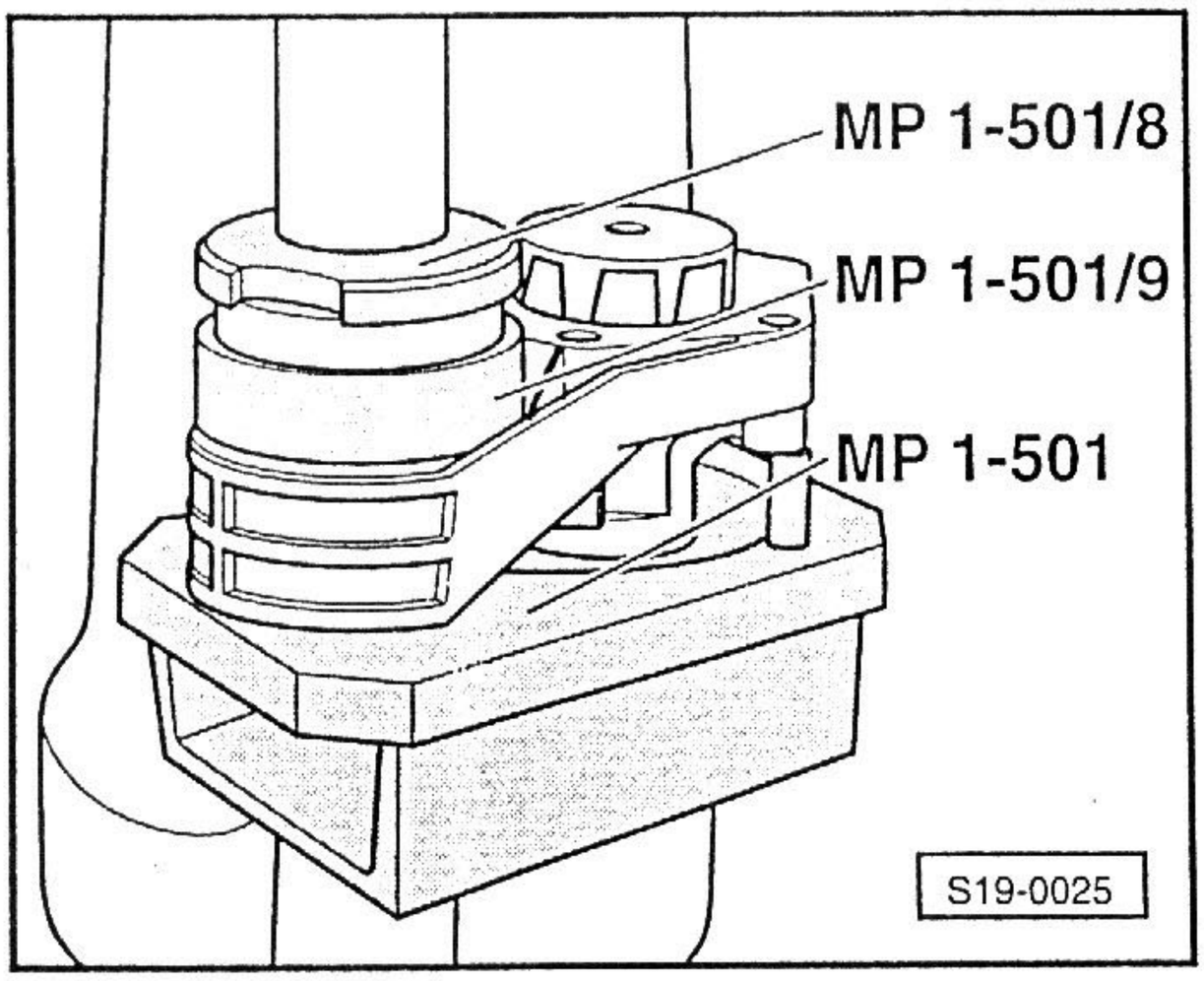
◄– Use insertion drift MP 1-503 to press in axial seal.



◄– Use assembly device MP 1-501, supporting bush MP 1-501/5 and collar ring MP 1-501/7 to press in vane.

Note:

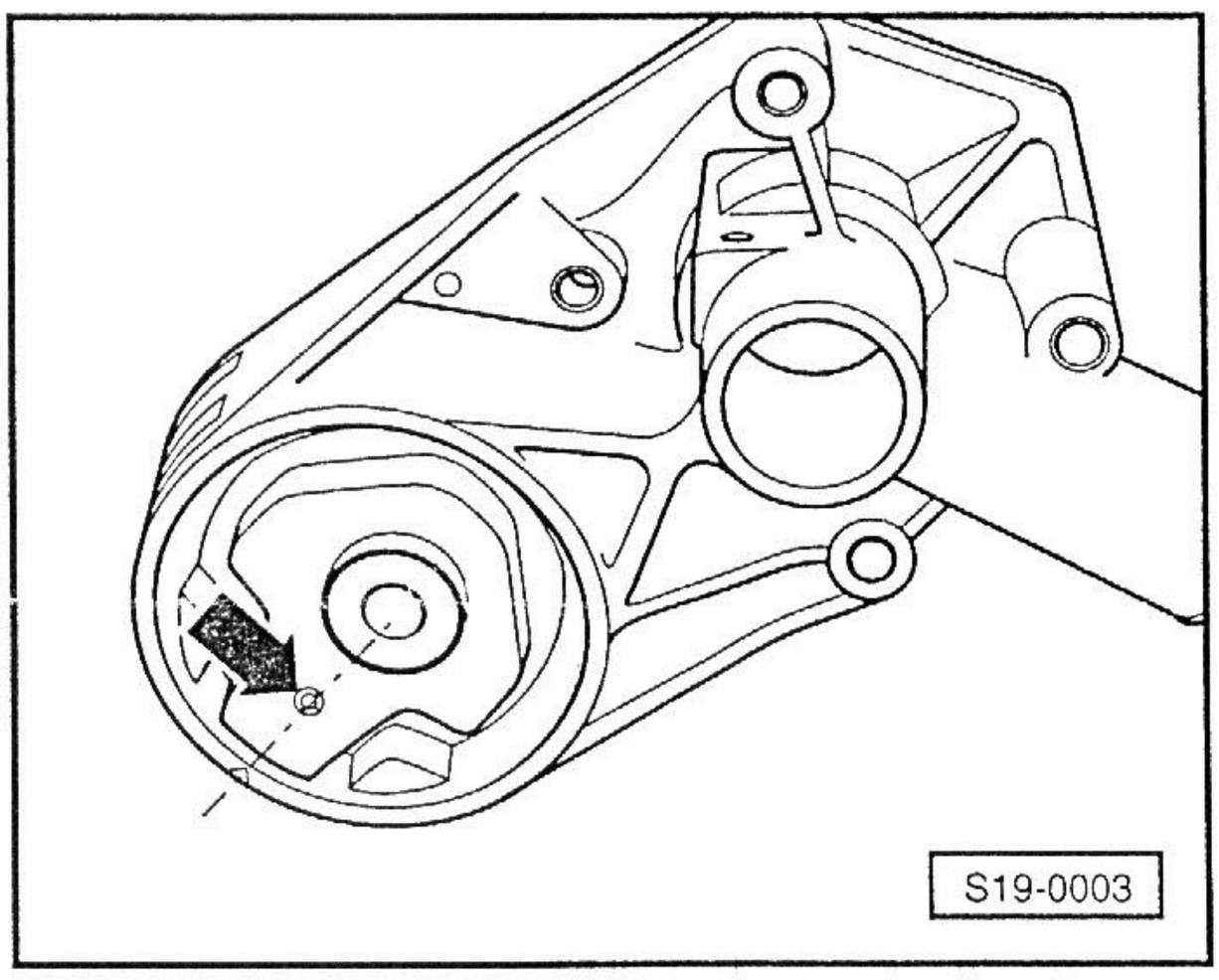
It is essential to ensure a gap of at least 0.5 mm between axial seal and vane. Fitting dimensions ⇒ Fig. 19-0018, page 19-17.



◀ – Use assembly device MP 1-501, washer MP 1-501/8 and ring MP 1-501/9 to press in bonded rubber bush.

Note:

Pay attention to fitting location
⇒ Fig. S19-0003.



◀ – Marking of bonded rubber bush -arrow- must be aligned with the notch on coolant pump housing.

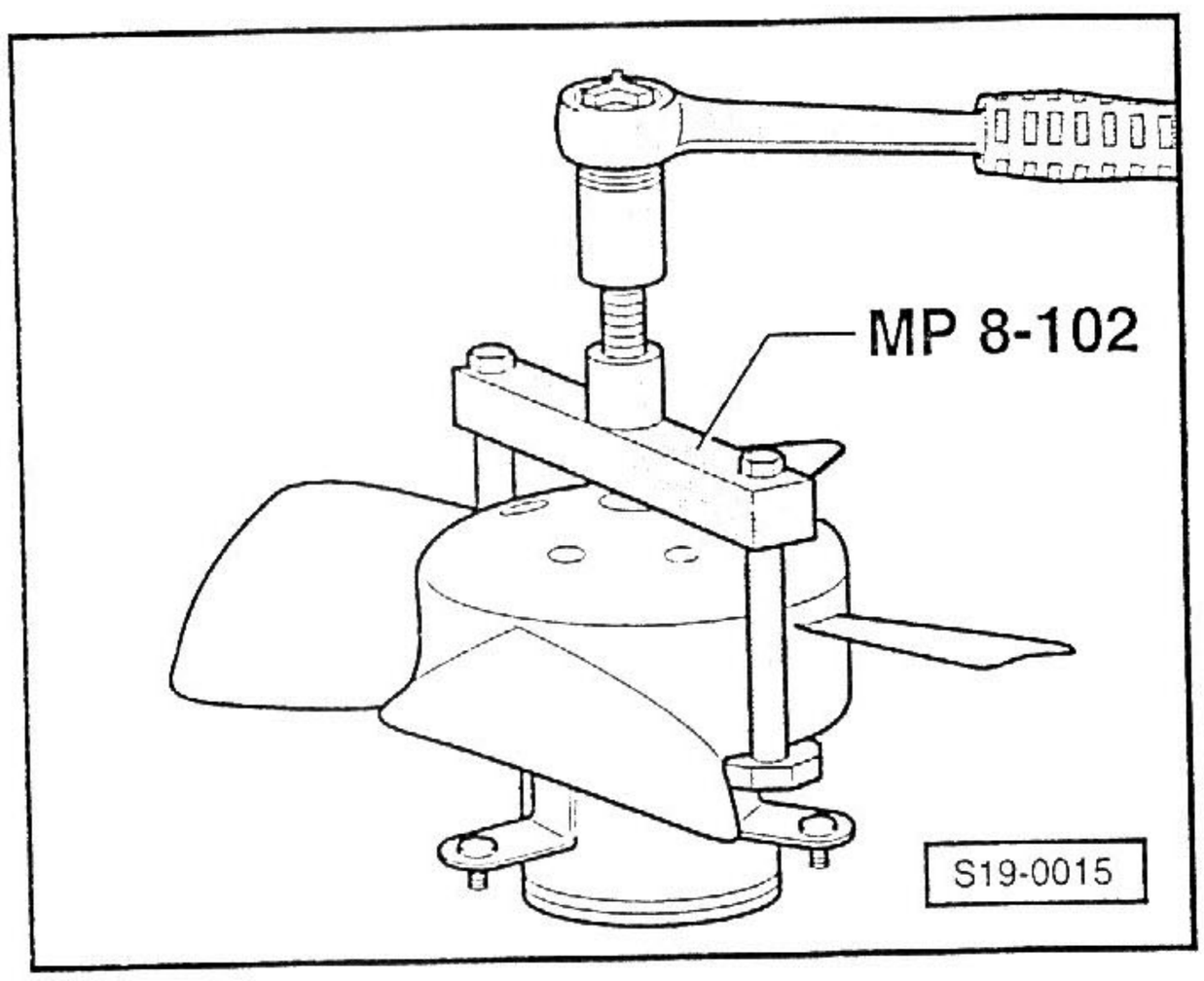
Removing and installing radiator and fan

Removing

– Drain coolant ⇒ page 19-8.

– Detach coolant hoses from the radiator.

– Unplug connector from the thermostatic switch and from the radiator fan.



– Remove strut.

– Unscrew securing bolts of the radiator.

– Lift out radiator together with fan.

– Unbolt fan ring from the radiator.

◀ – Unbolt fan from the fan ring and use puller MP 8-102 to pull off fan wheel.

Installing

Installation is performed in the reverse order; pay attention to the following points:

– Press fan wheel onto fan; do not strike.

– Pay attention to fitting location of fan ⇒ Fig. 19-0001, page 19-2.

– Tighten securing nuts of fan to
10 Nm.

– When installing the radiator, ensure that the mounts are correctly located.

– Tighten securing bolts of radiator and strut to
10 Nm.

– Pour in coolant ⇒ page 19-8.

Removing and installing parts of the fuel supply system

Pay attention to safety precautions ⇒ page 20-10.

Pay attention to rules for cleanliness ⇒ page 20-11.

Removing and installing fuel tank with attached parts and fuel filter:

Models with Mono-Motronic ⇒ page 20-2.

Models with carburettor engine ⇒ page 20-5.

Adjusting throttle cable ⇒ page 20-12.

Testing fuel pump relay:

⇒ Mono-Motronic fuel injection and ignition system; repair group 24; Testing fuel pump relay

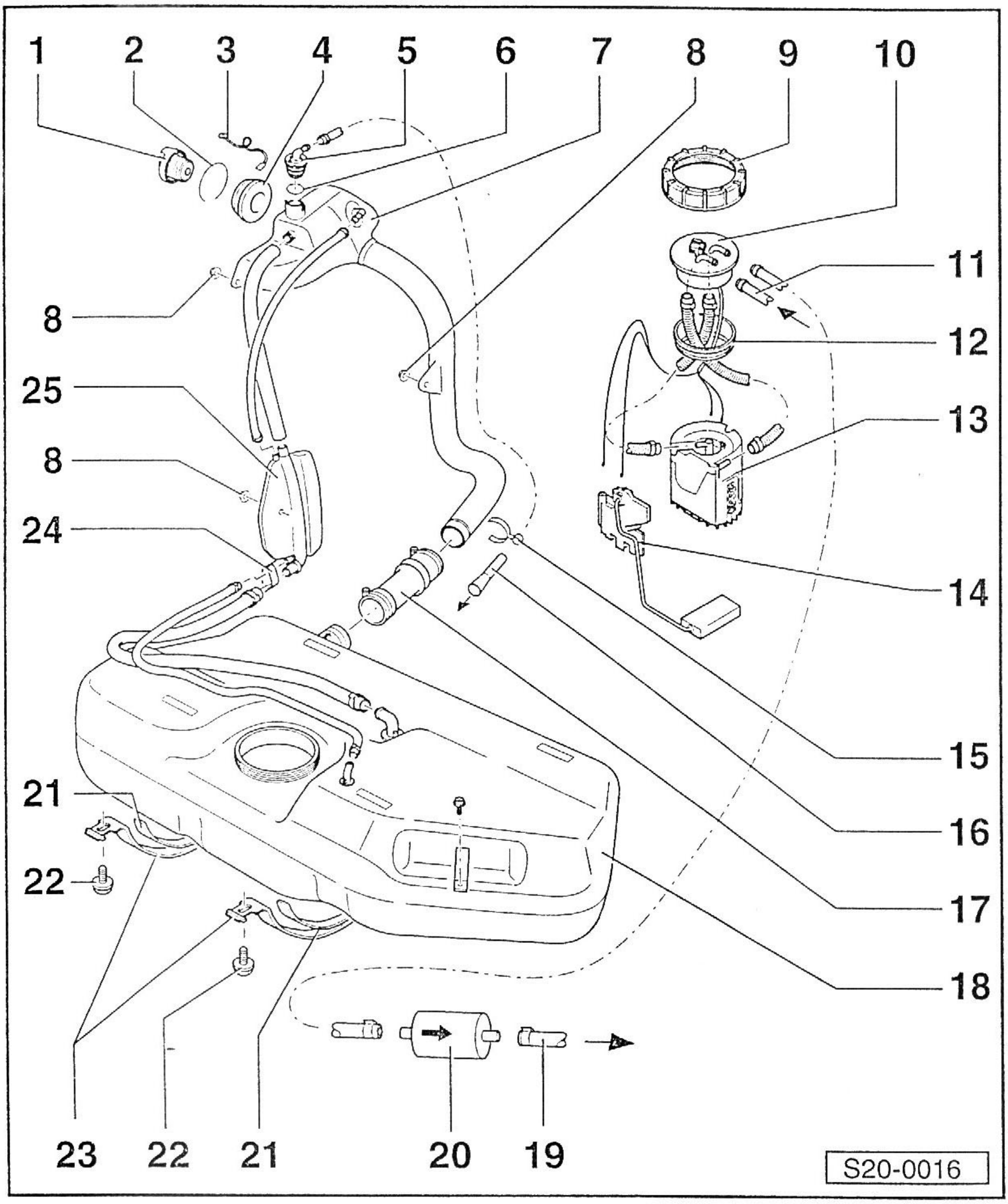
⇒ Simos 2P fuel injection and ignition system; repair group 24; Testing fuel pump relay

Note:

Hose connections are secured with clamp-type or screw-type clips.

Removing and installing fuel tank with attached parts and fuel filter

-



Mono-Motronic; Simos 2P

1 - Fuel filler cap
- Replace seal if damaged

2 - Tensioning ring

3 - Earth connection

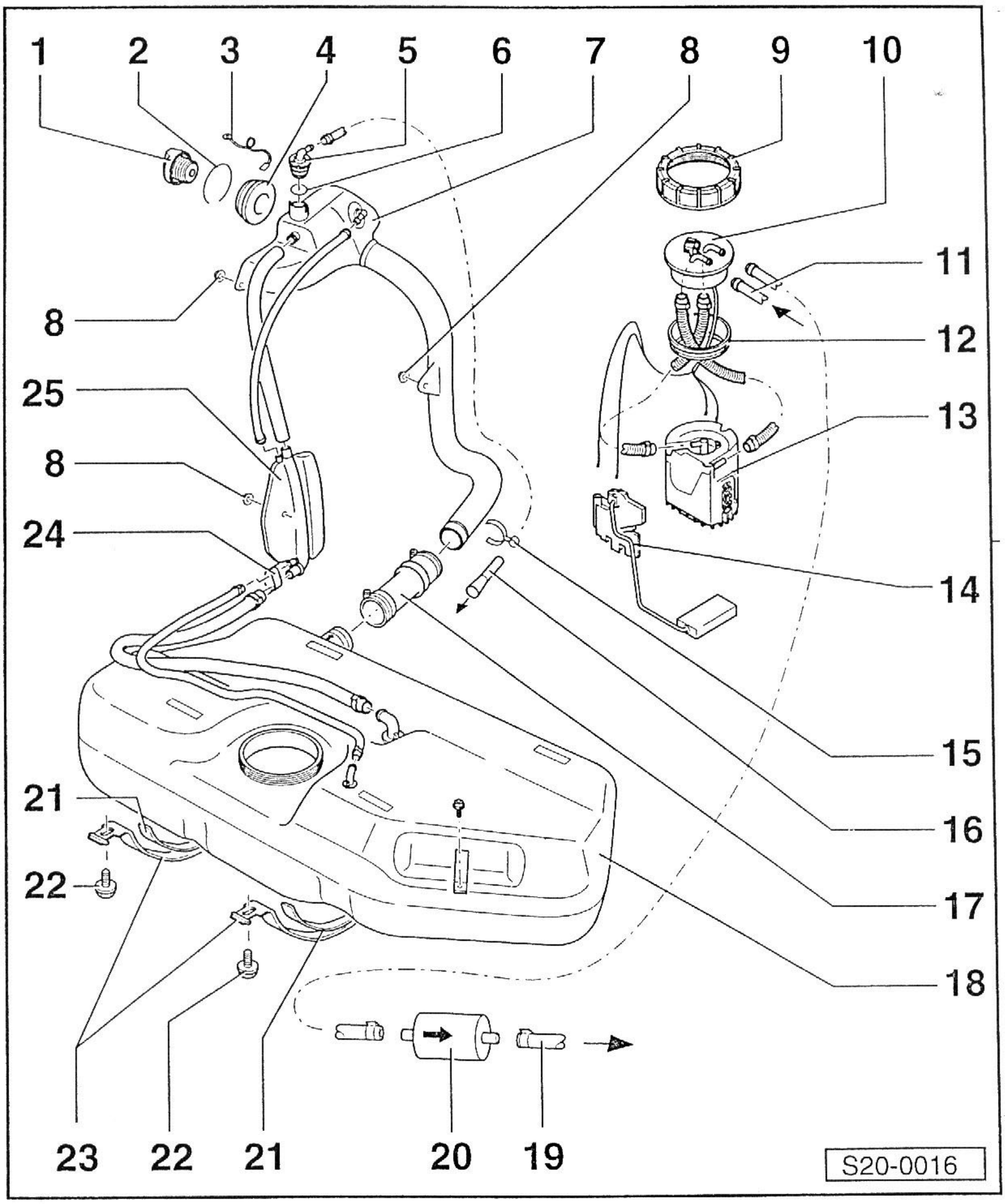
4 - Rubber bowl

5 - Anti spill valve
- to remove, unclip valve and lift out of the filler neck
- Blow into valve to check if clear; valve vertical: open. Valve tilted 30°: closed

6 - O-ring
- Replace if damaged

7 - Filler neck reservoir
- Removing installing ⇒ page 20-26

8 - 10 Nm



9 - Union nut
- ♦ Use wrench MP 8-525 for removing and installing

10 - Flange
- ♦ Pay attention to installation position at fuel tank ⇒ page 20-8, Fig. 1

11 - Return flow pipe
- ♦ from fuel injection unit

⇒ Mono-Motronic fuel injection and ignition system; repair group 24
- ♦ from distributor

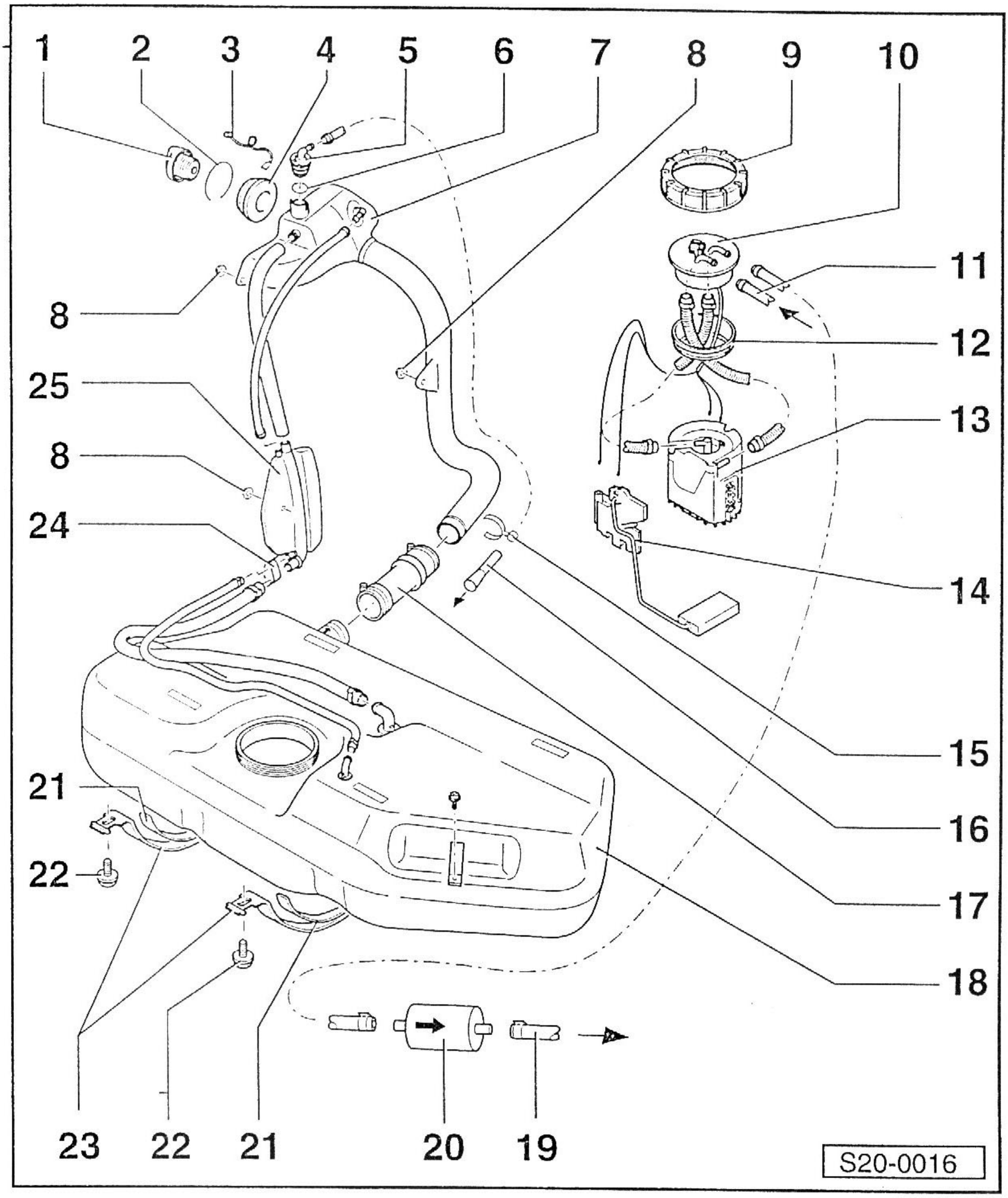
⇒ Simos 2P fuel injection and ignition system; repair group 24

12 - Seal
- ♦ Moisten with fuel for installing
- ♦ Replace if damaged

13 - Fuel delivery unit
- ♦ Removing and installing ⇒ page 20-16
- ♦ Testing fuel pump ⇒ page 20-18

14 - Fuel gauge sender
- ♦ Removing and installing ⇒ page 20-14

15 - Holder



16 - Vent pipe
- to activated charcoal filter ⇒ page 20-28, item 5

17 - Connection hose

18 - Fuel tank
- Removing and installing ⇒ page 20-24

19 - Fuel feed pipe
- to fuel injection unit

⇒ Mono-Motronic fuel injection and ignition system; repair group 24
- to distributor

⇒ Simos 2P fuel injection and ignition system; repair group 24

20 - Fuel filter
- Installation position: arrow points in direction of flow

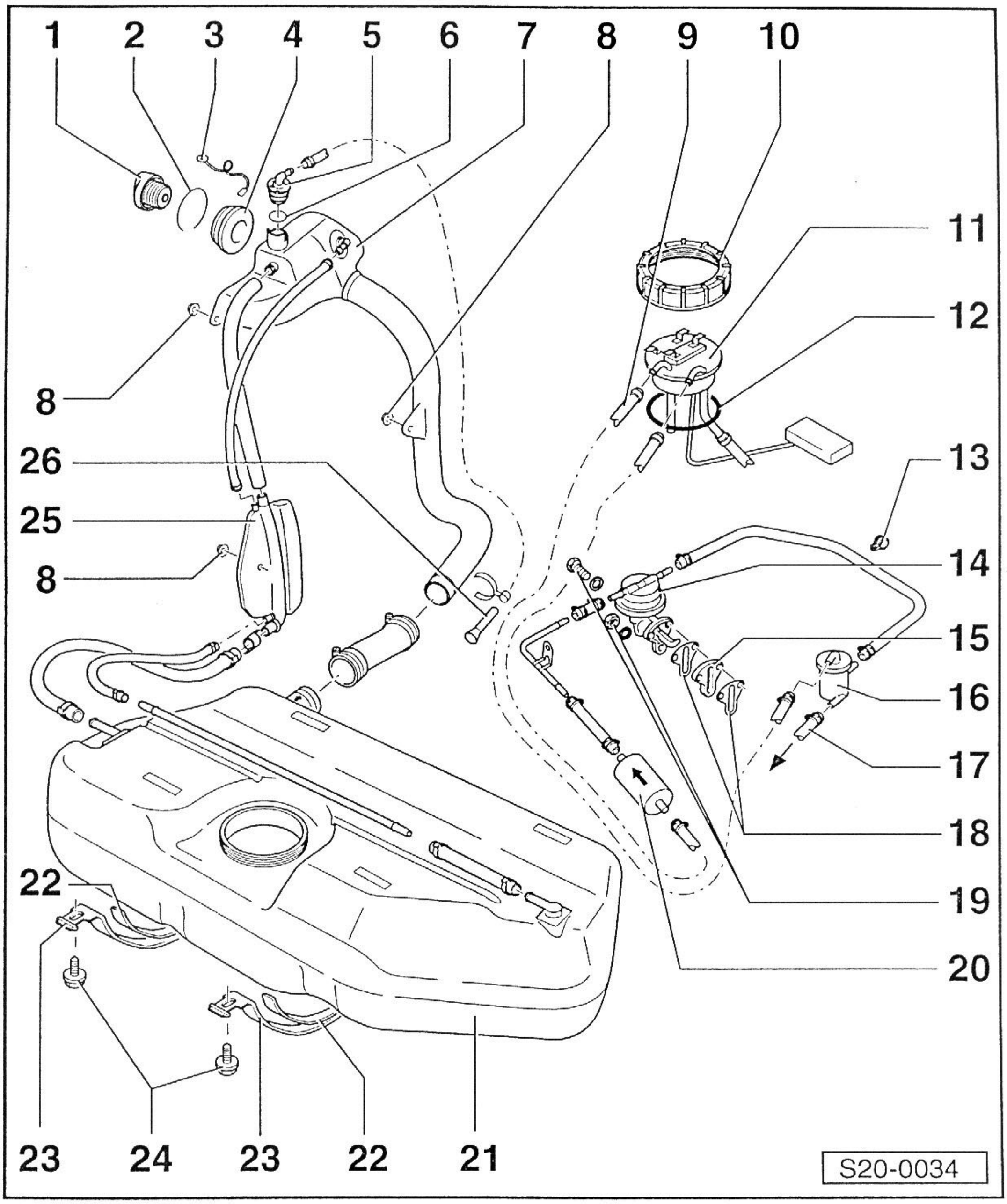
21 - Rubber base

22 - 25 Nm

23 - Tensioning strap
- Pay attention to different versions

24 - Pipe guide

25 - Expansion reservoir



Carburetor engine

1 - **Fuel filler cap**
- ♦ Replace seal if damaged

2 - **Tensioning ring**

3 - **Earth connection**

4 - **Rubber bowl**

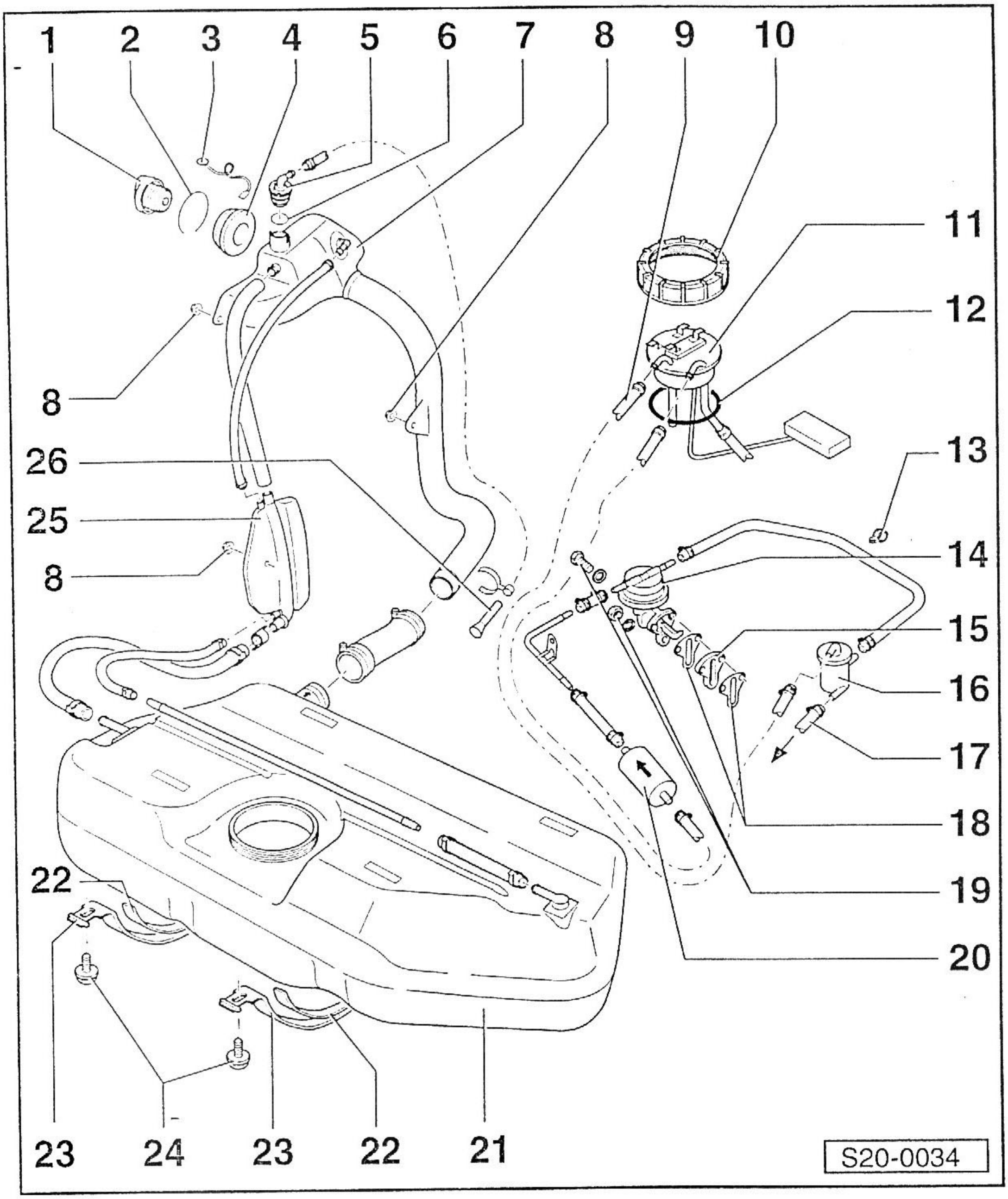
5 - **Gravity valve**
- ♦ To remove, unclip valve and lift out of the filler neck
- ♦ Check that valve is not obstructed by blowing into valve
  Valve vertical when open.
  Valve tilted 30° when closed

6 - **O-ring**
- ♦ Replace if damaged

7 - **Filler neck reservoir**
- ♦ Removing and installing
  ⇒ page 20-26

8 - **Hexagon nut**
- ♦ 10 Nm

9 - **Return pipe**



10 - **Union nut**
- ♦ Remove and install with wrench MP 8-502

11 - **Fuel gauge sender**
- ♦ Removing and installing ⇒ page 20-14
- ♦ Fitting dimensions ⇒ page 20-8, Fig. 2

12 - **Seal**
- ♦ Replace if damaged

13 - **Bracket**

14 - **Fuel pump**
- ♦ Delivery: at least 30 ltr./hour at 50 strokes/minute

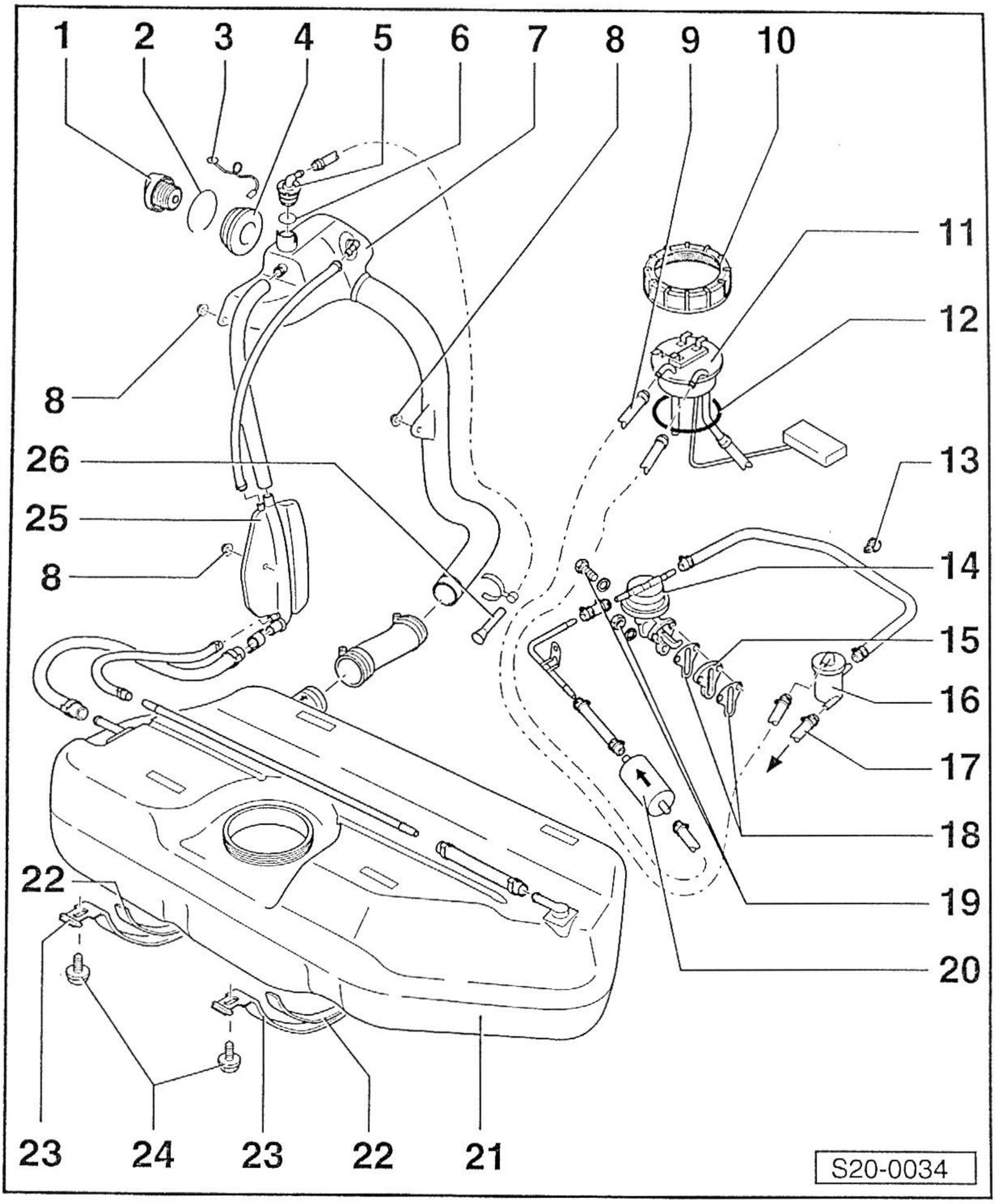
15 - **Sealing flange**
- ♦ Replace if damaged

16 - **Fuel reservoir**

17 - **To carburetor**

18 - **Gasket**
- ♦ Replace

19 - **Hexagon bolt/hexagon nut**
- ♦ 20 Nm



20 - Fuel filter
- ♦ Fitting location: arrow points in direction of flow
- ♦ Replacing ⇒ page 20-23

21 - Fuel tank
- ♦ Removing and installing ⇒ page 20-25

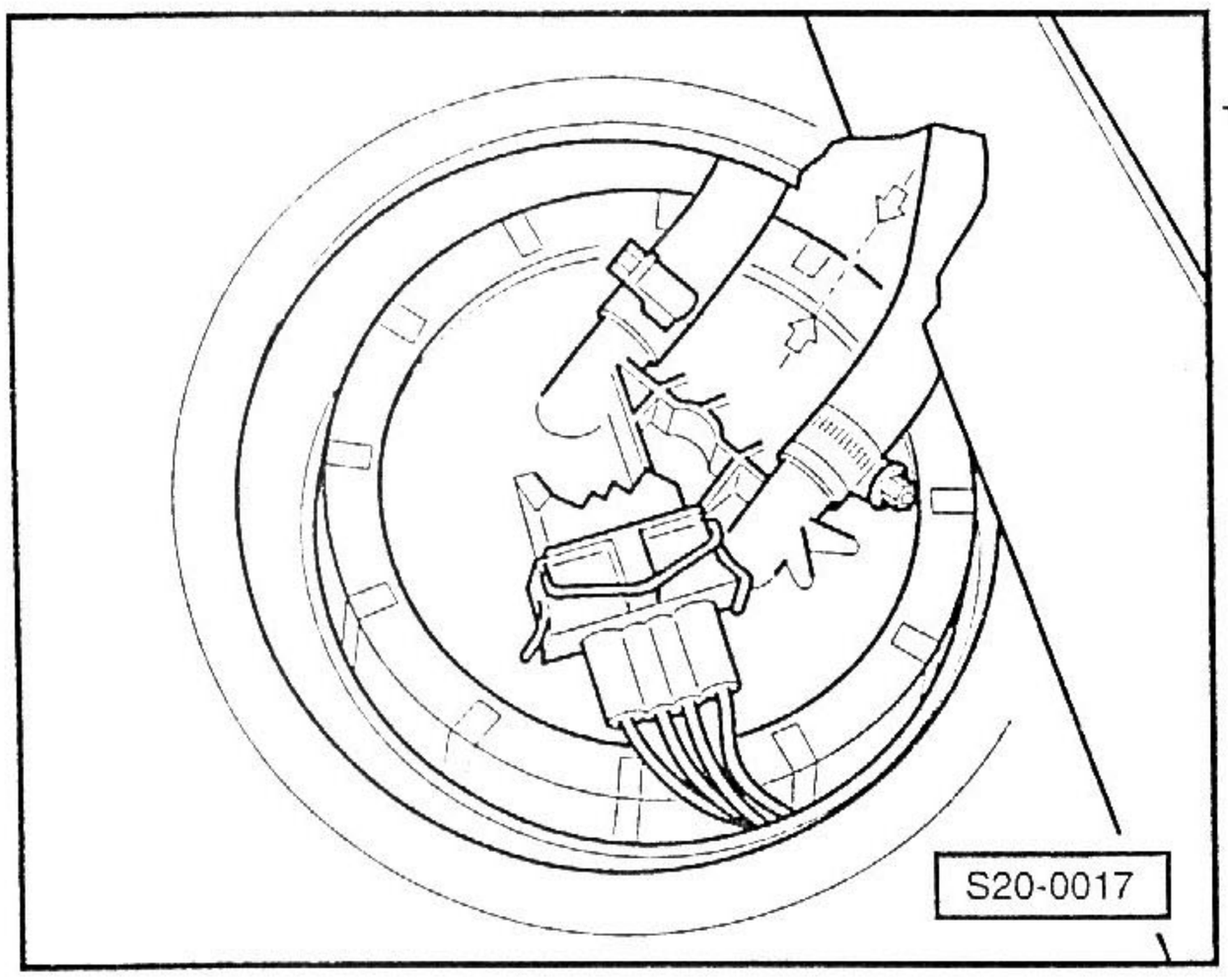
22 - Rubber base

23 - Tensioning strap
- ♦ Pay attention to different versions

24 - Hexagon bolt
- ♦ 25 Nm

25 - Expansion tank

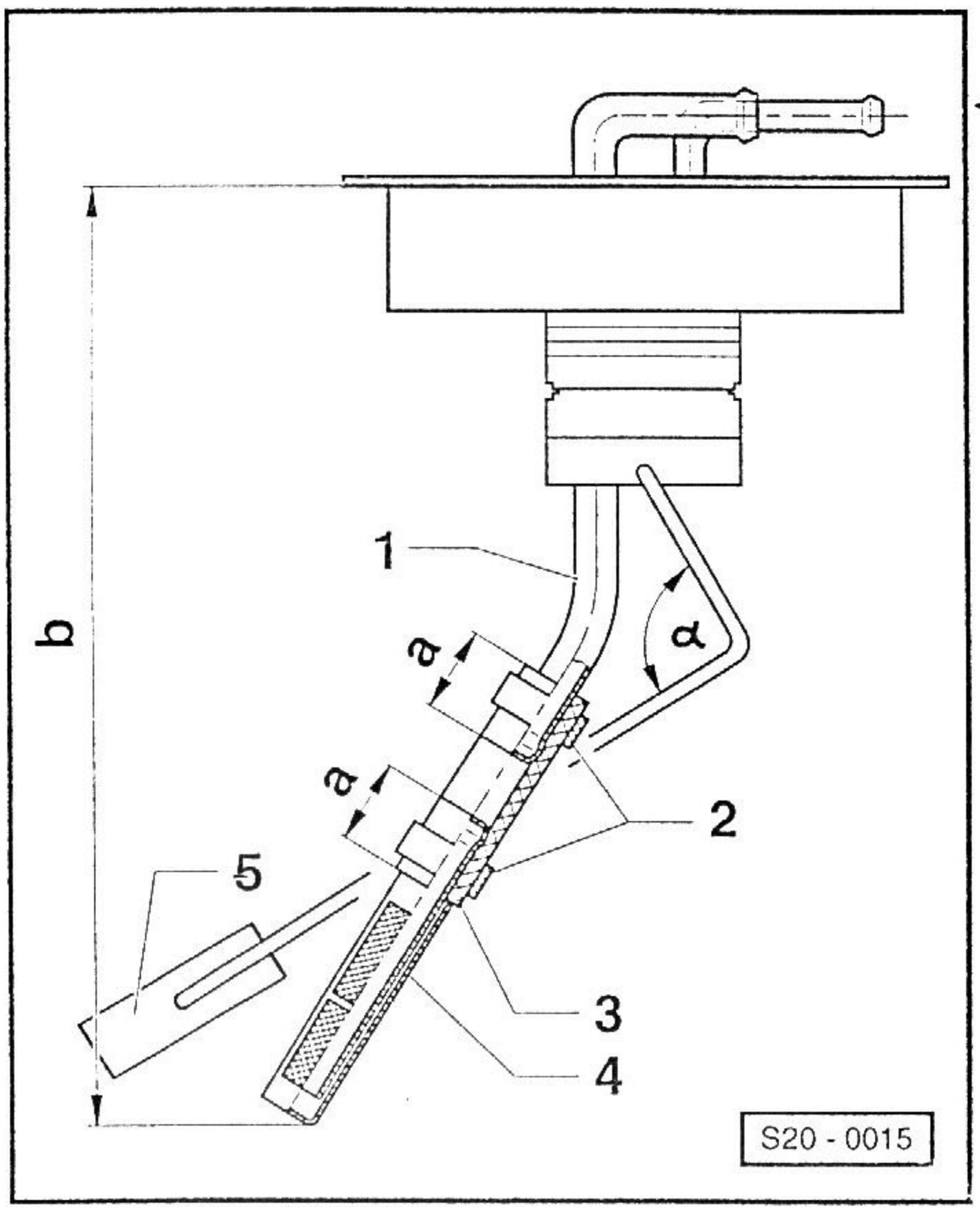
26 - Vent pipe
- ♦ To atmosphere



◀ Fig. 1 Installation position of flange of fuel delivery unit

Models with fuel injection system

Marking on flange should be aligned with marking on the fuel tank.



◀ Fig. 2 Installation dimensions of fuel gauge sender

Models with carburettor engine

If the intake pipe was disconnected for carrying out repairwork -e.g. for cleaning- the functional dimensions -a- and -b- should be re-created.

a = 17.5 mm
b = about 190 mm
α = 90°

1 - Connection pipe to fuel feed pipe

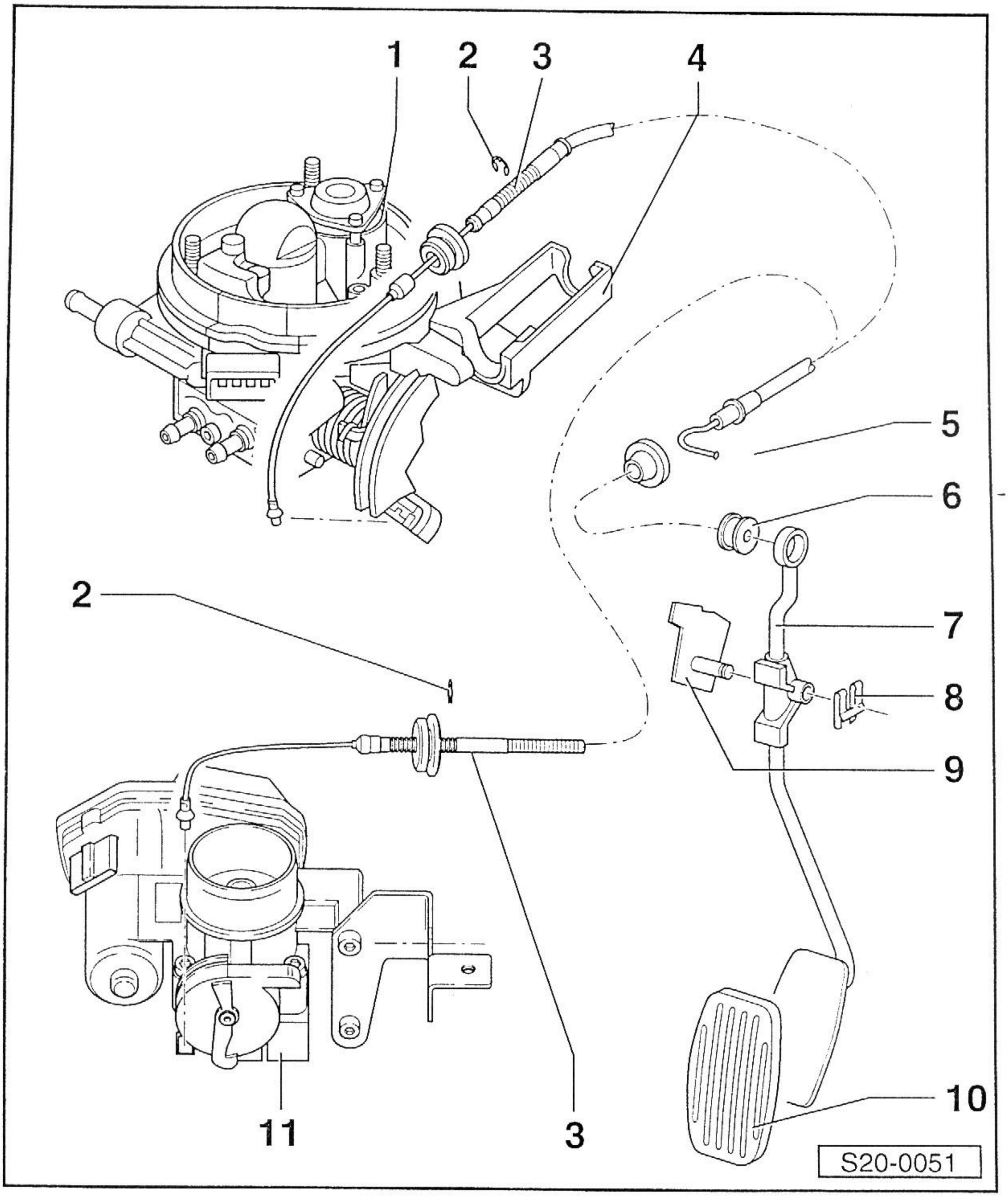
2 - Clamp-type clips

3 - Hose

4 - Intake pipe with filter

5 - Float

Throttle mechanism



1 - Fuel injection unit/carburettor
- Fuel injection unit for Mono-Motronic

2 - Locking washer

3 - Throttle cable
- Adjusting ⇒ page 20-12

4 - Supporting bracket
- for throttle cable

5 - Rubber grommet
- in bulkhead

6 - Rubber bush

7 - Accelerator pedal

8 - Locking plate
- Ensure tightly fitted

9 - Pivot pin

10 - Accelerator pedal pad

11 - Fuel injection unit
- Fuel injection unit for Simos 2P

Safety precautions

Pay attention to the following safety precautions when working on the fuel supply system:

- Always observe the relevant safety precautions.
- Avoid your skin coming into contact with fuel! Wear fuel-resistant gloves!
- When removing and installing the fuel gauge sender or the fuel pump (fuel delivery unit) from a fuel tank which is full or partially full, pay attention to the following precautions:
  The extraction hose of an exhaust extraction system which is switched on must be positioned close to the assembly opening of the fuel tank to extract the fuel vapours which are released, even before starting the work.
  If no exhaust extraction system is available, a radio fan with a delivery volume of more than 15 m^3/h may also be used (motor of fan not in air stream of fan).

Rules for cleanliness

Pay careful attention to the following "5 rules" for cleanliness when performing work on the fuel supply and fuel injection system:

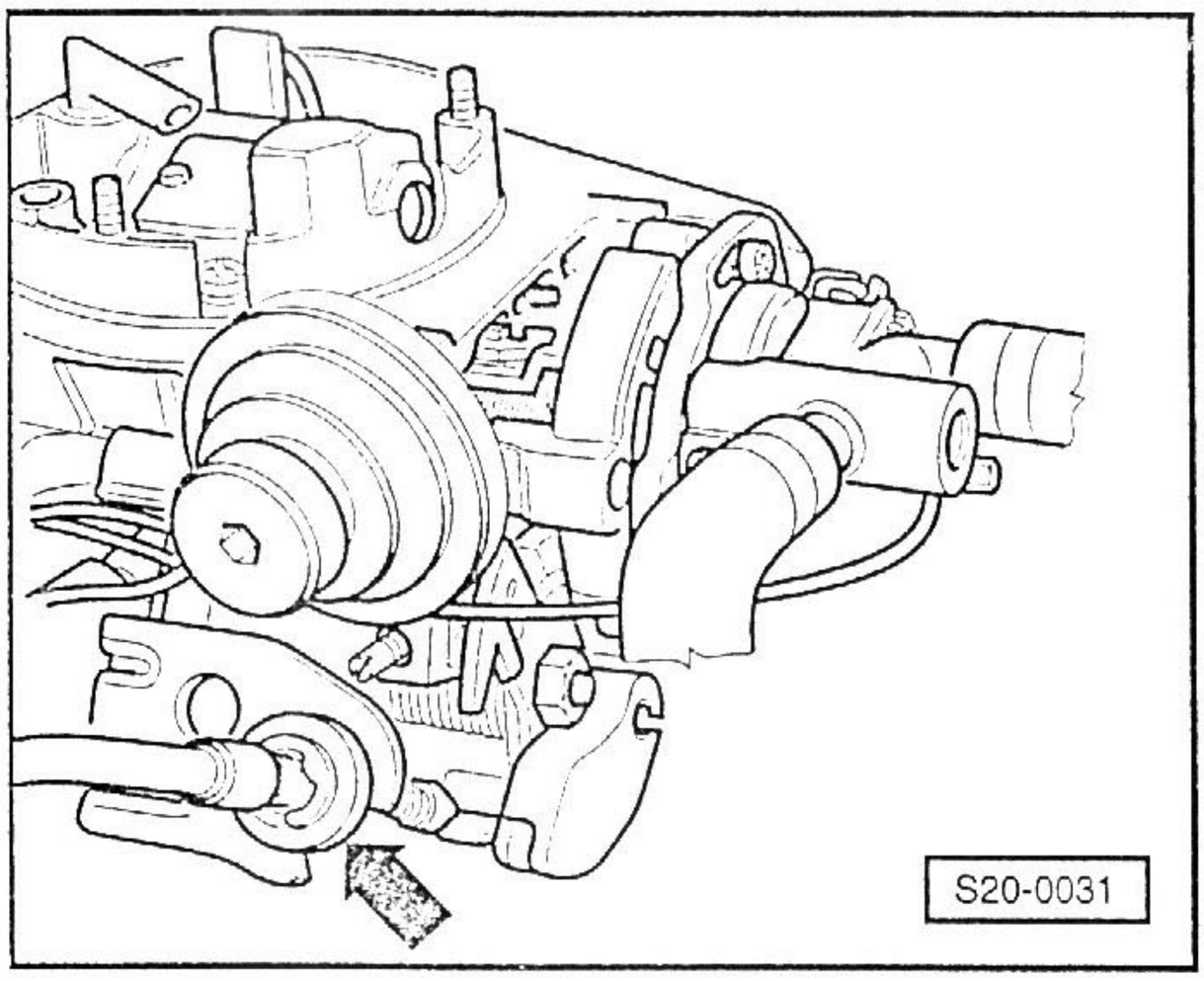
- Thoroughly clean connection points and the surrounding area before disconnecting.

- Place removed parts down on a clean surface and cover over. Do not use fluffing cloths!

- Carefully cover over or seal opened components if repairs are not performed immediately.

- Install only clean parts:
  Do not remove replacement parts from their wrapping until just before installing.
  Do not use parts which have been stored unwrapped (e.g. in tool boxes etc.).

- When the system is open:
  Avoid working with compressed air if possible.
  Avoid moving the car if possible.



Adjusting throttle cable

Models with carburettor engine

- Depress accelerator pedal to the full throttle position.

- Check full throttle position at the throttle valve lever. Full throttle position must just be reached.

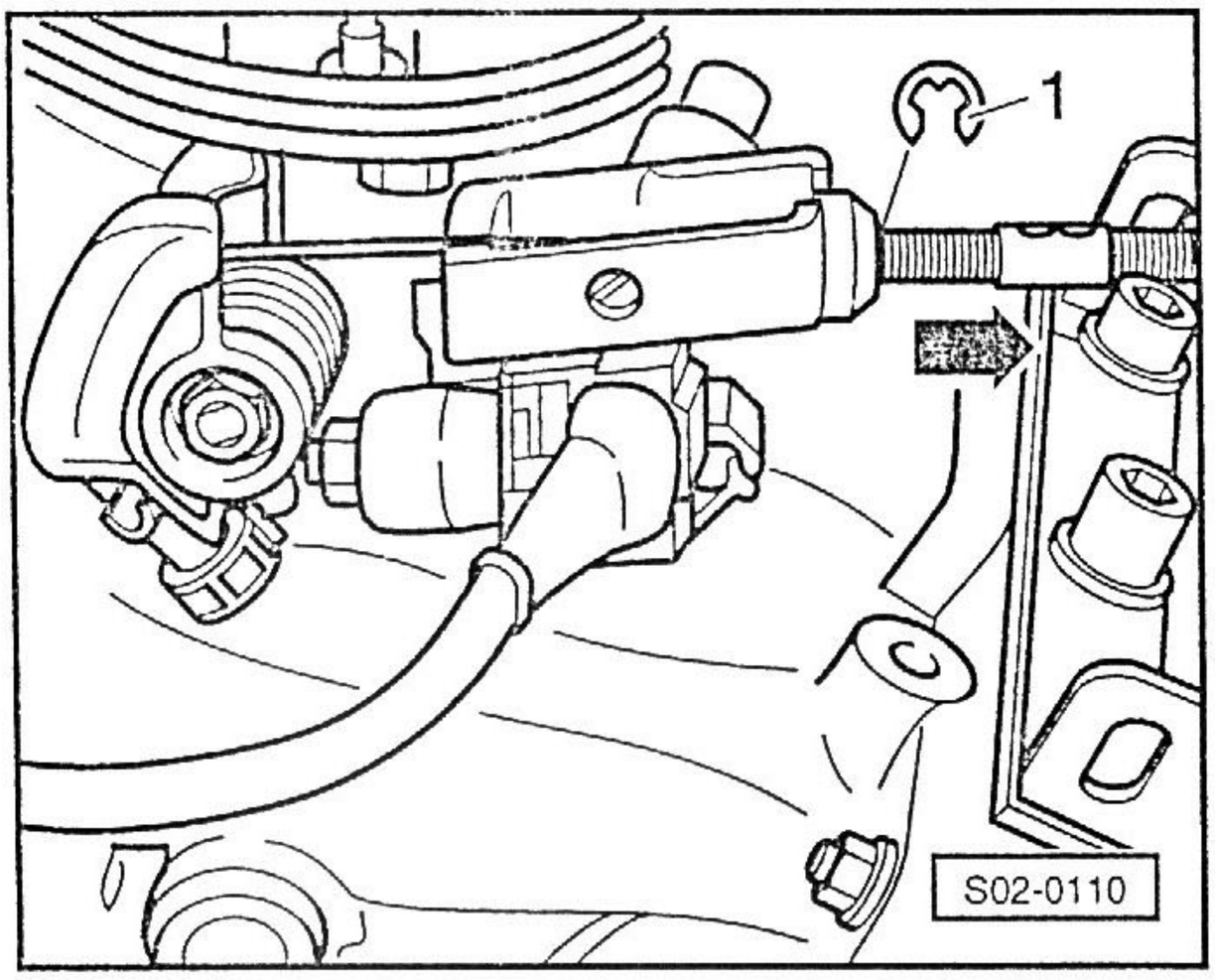
◀ - Adjust throttle cable by re-positioning the locking detent -arrow- at the supporting bracket.

Models with fuel injection system

Special tools, testers and aids required

♦ Vehicle system tester V.A.G 1552 with cable V.A.G 1551/3.

Models with Mono-Motronic



◀ - Adjust throttle cable by re-positioning the locking detent -1- at the supporting bracket so that the full throttle position is just reached at the throttle valve lever.

- Connect vehicle system tester V.A.G 1552 and select control unit for engine electronics (address word 01); engine not running, ignition switched on.

⇒ Mono-Motronic fuel injection and ignition system; repair group 01; Self-diagnosis.

TEST of vehiele systems Select function XX	HELP

◀ Readout on display:

- Enter 04 for the function „Initiate basic setting“ and confirm entry with the key Q.

Basic setting Enter display group number XX	HELP

◀ Readout on display:

Note:

If a different readout appears on the display:
⇒ Operating Instructions of V.A.G 1552.

- Enter 00 for „display group number“ and confirm entry with the key Q.

Basic setting 0 1 2 3 4 5 6 7 8 9 10	→

◀ Readout on display:
(1...10 = display fields)

- Depress accelerator pedal fully and hold in this position for at least 5 seconds. Check numerical readout in display field 3.
  Specification: 240...255

- Release accelerator pedal. The plunger of the throttle valve positioner moves into the basic position (fully retracted).

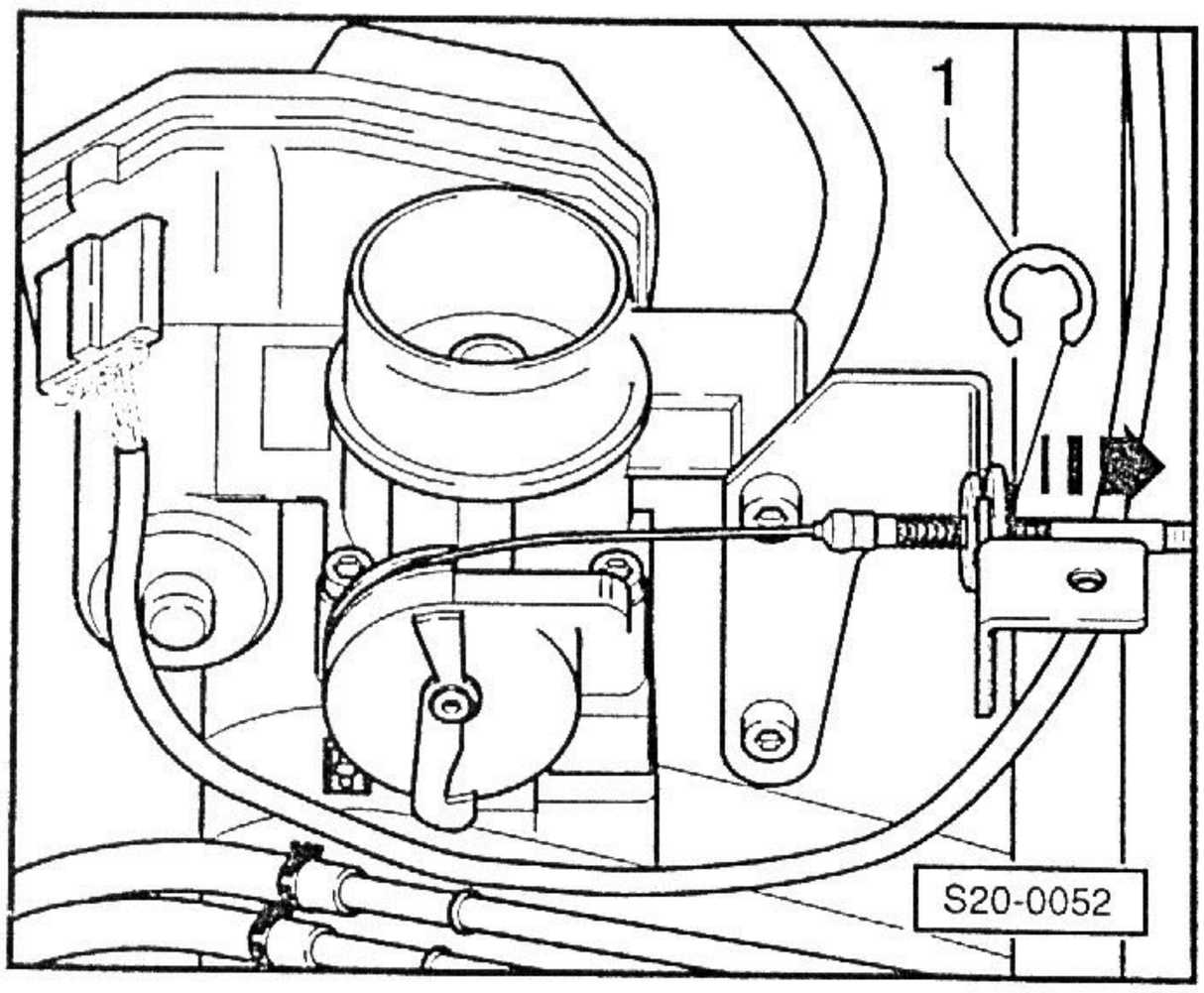
- Check readout in display field 2.
  Specification: 5...15

If the specifications are not achieved:

- Repeat adjustment of accelerator cable.

Models with Simos 2P

◄ - Adjust throttle cable by re-positioning the locking detent -1- at the supporting bracket so that the full throttle position is just reached at the throttle valve lever.



- Connect vehicle system tester V.A.G 1552 and select control unit for engine electronics (address word 01); engine not running, ignition switched on.

⇒ Mono-Motronic fuel injection and ignition system; repair group 01; Self-diagnosis.

TEST of vehicle systems Select function XX	HELP

◄ Readout on display:

- Enter 04 for the function „Initiate basic setting" and confirm entry with the key Q.

Basic setting Enter display group number XX	HELP

◄ Readout on display:

Note:

If a different readout appears on the display:
⇒ Operating Instructions of V.A.G 1552.

- Enter 00 for „display group number" and confirm entry with the key Q.

Basic setting 0 1 2 3 4 5 6 7 8 9 10	→

◄ Readout on display:
(1...10 = display fields)

- Depress accelerator pedal fully and hold in this position for at least 5 seconds. Check numerical readout in display field 8
  Specification: 170...175

- Release accelerator pedal. The plunger of the throttle valve positioner moves into the basic position (fully retracted).

- Check readout in display field 8.
  Specification: 10...11

If the specifications are not achieved:

- Repeat adjustment of accelerator cable.

Removing and installing fuel gauge sender

Models with fuel injection system

Special tools, testers and aids required

♦ Wrench MP 8-525

Removing

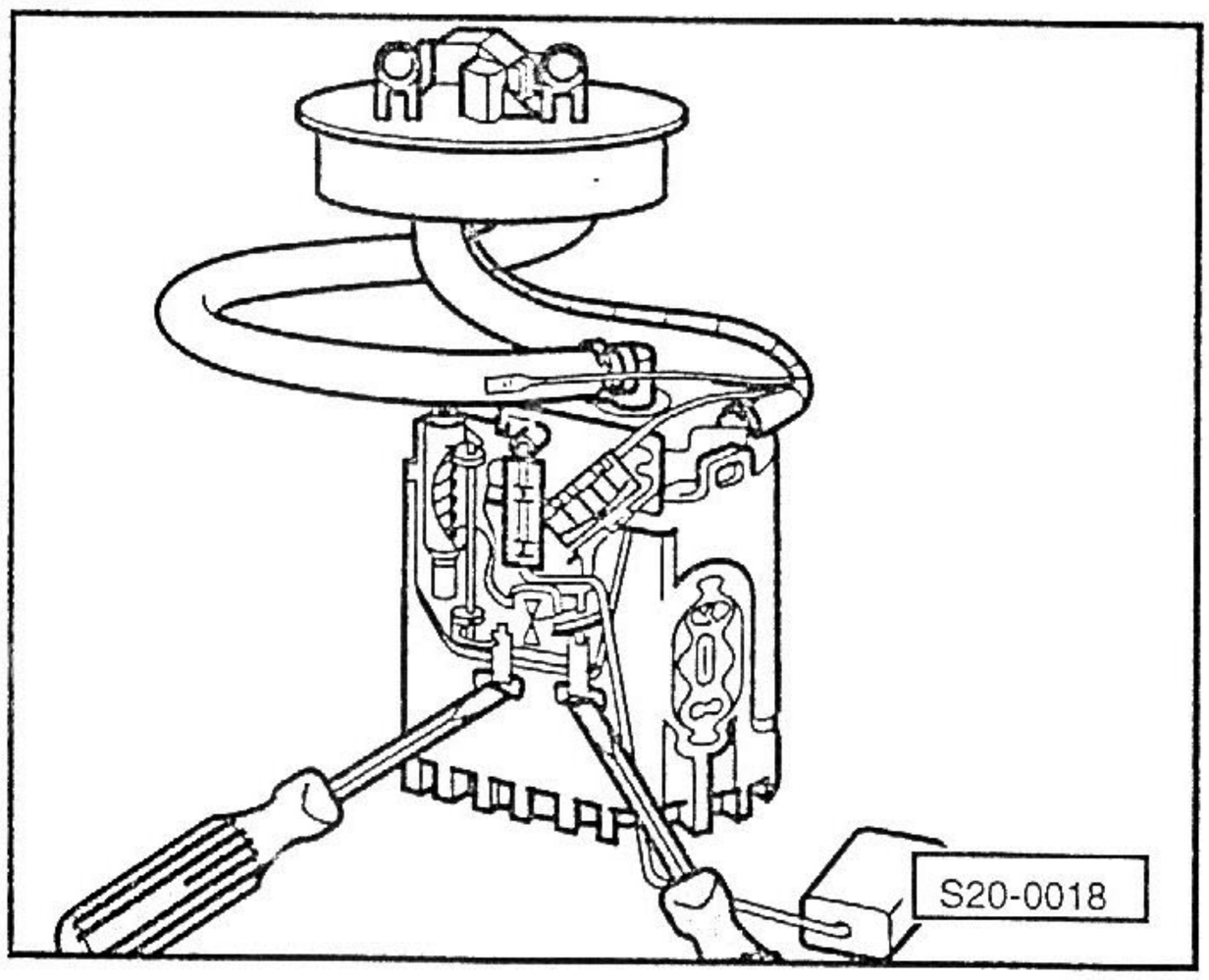
- Remove fuel delivery unit
  ⇒ page 20-16.

◀ - Unclip sender at the fuel delivery unit and lift out.

Installing

Installation of the fuel gauge sender is performed in the reverse order.

- Install fuel delivery unit ⇒ page 20-16.



Models with carburettor engine

Special tools, testers and aids required

♦ Special tool MP 8-502

Removing

- Pay attention to safety precautions
  ⇒ page 20-10.

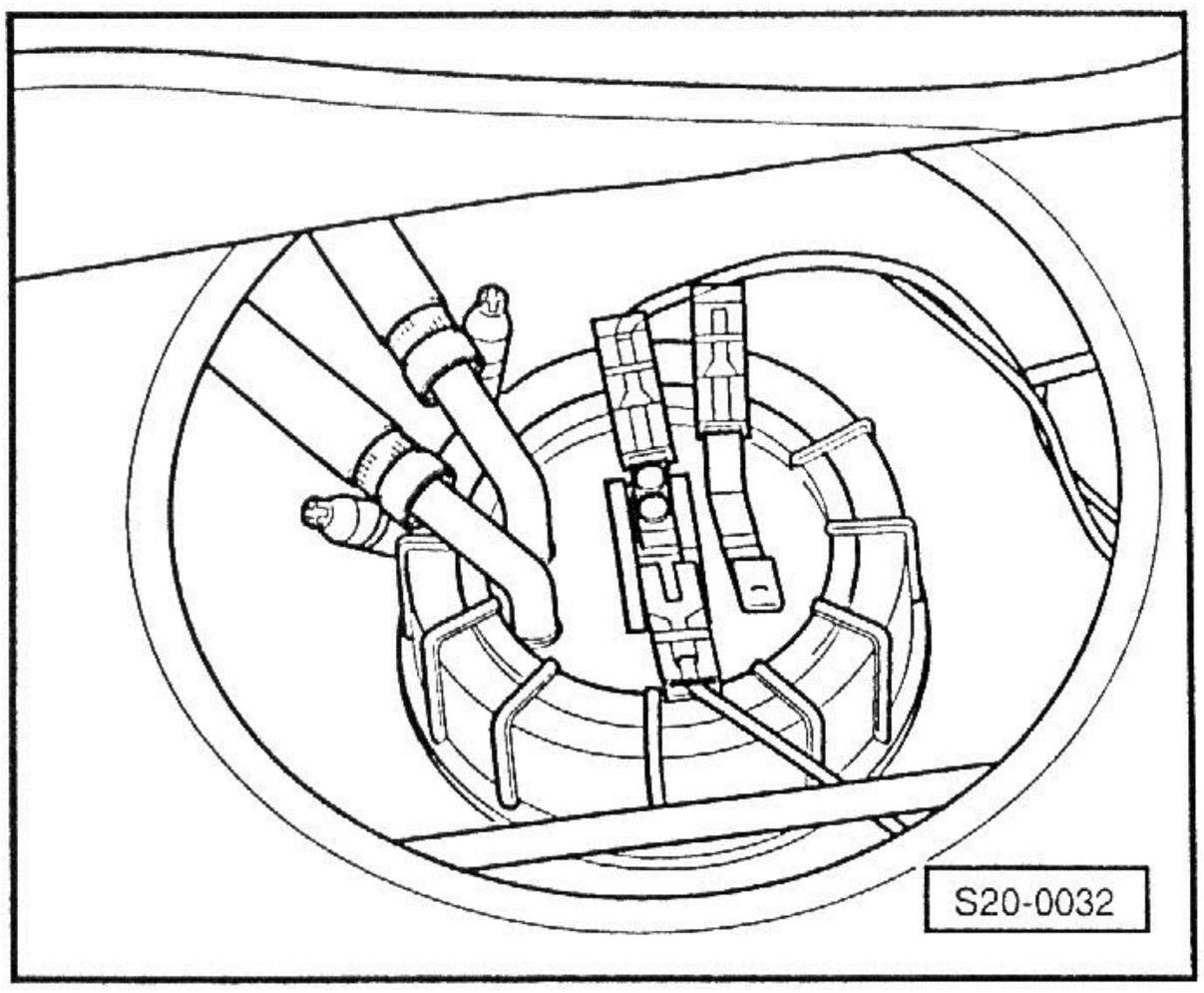
- Switch off ignition (if not already off) and disconnect earth strap at the battery.

Note:

If radio fitted with anti-theft code, determine code first of all.

- Fold rear seat forward.

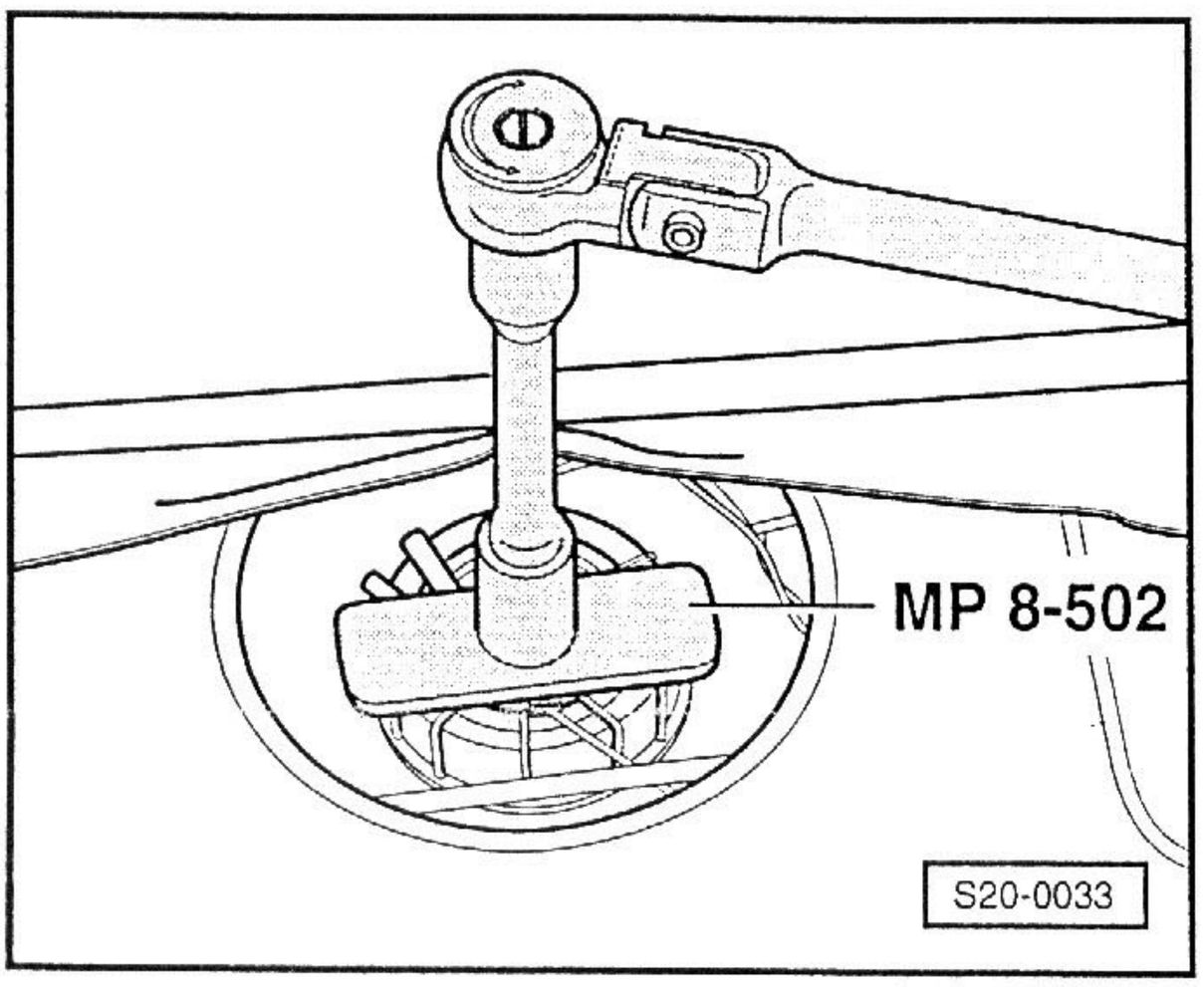
- Remove cover of boot floor.



◄- Unplug the connectors and also the feed and return hoses from the fuel gauge sender.

Note:

On models with carburettor engine 05.96➤ unplug connector ⇒ page 20-24.



◄- Use MP 8-502 to unscrew union nut. -

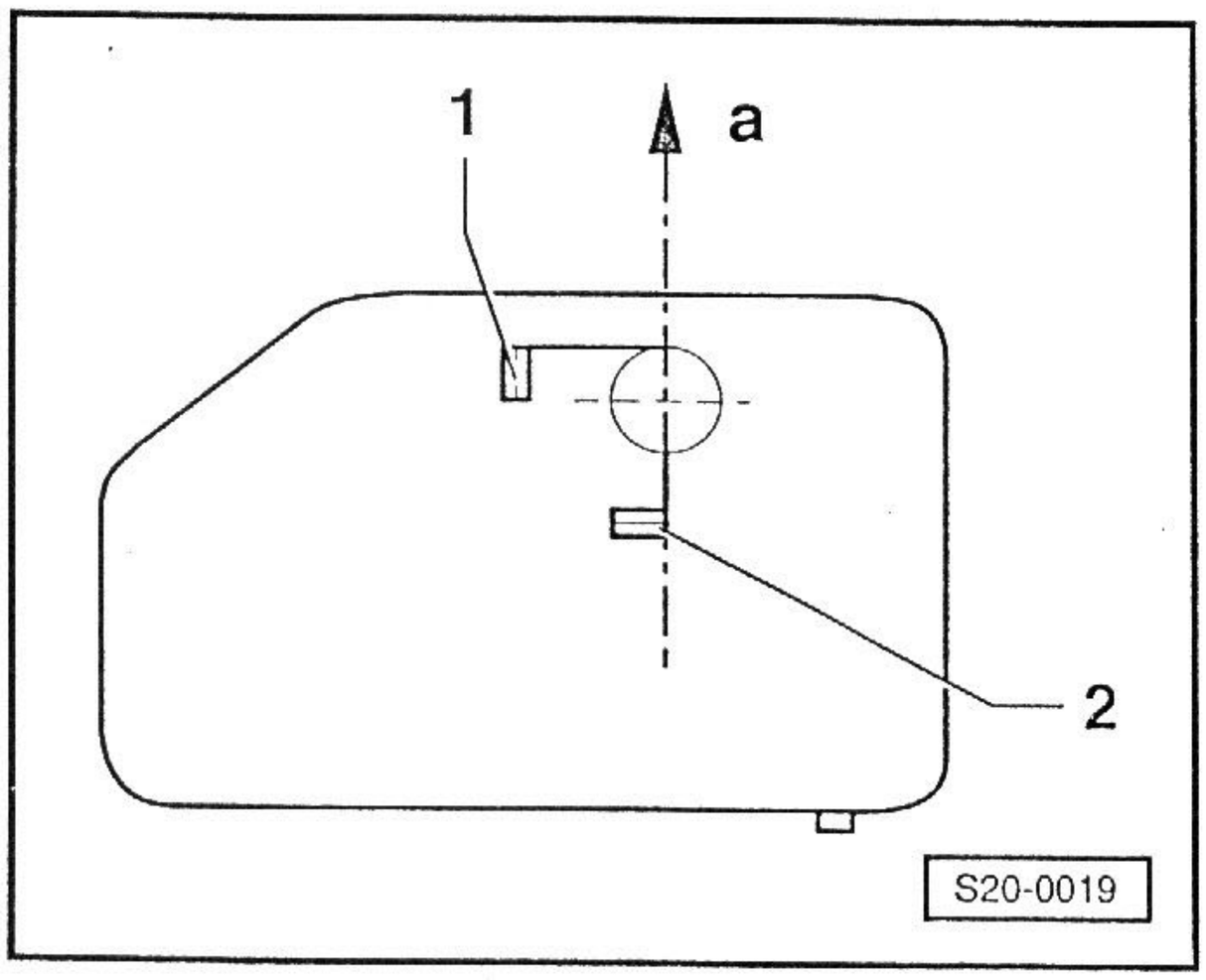
- Pull fuel gauge sender out of the opening of the fuel tank.

Installing

Installation of the fuel gauge sender is performed in the reverse order.

Notes:

- *When inserting the sender, ensure that the float arm is not bent.*
- *Moisten the seal of the flange with fuel for installing.*
- *Ensure that the seal between fuel tank and sender housing is correctly installed.*



◄♦ *If the fuel gauge sender is correctly installed, the float -2- points in the opposite direction of travel -a-.*

- *Tighten union nut to 30 Nm.*
- *The line connections are colour-coded.*
- *Do not allow cables to touch earth otherwise the fuel gauge may be damaged.*
- *The fuel feed and return flow hoses on models with engine 135 are of different diameters.*
- *Secure hose connections with clips.*

Removing and installing fuel delivery unit

Models with fuel injection system

Special tools, testers and aids required

- Wrench MP 8-525
- Installation device MP 8-526

Removing

- Pay attention to safety precautions
  ⇒ page 20-10.

- Switch off ignition (if not already off) and disconnect earth strap at the battery.

Note:

If radio is fitted with anti-theft code, determine code first of all.

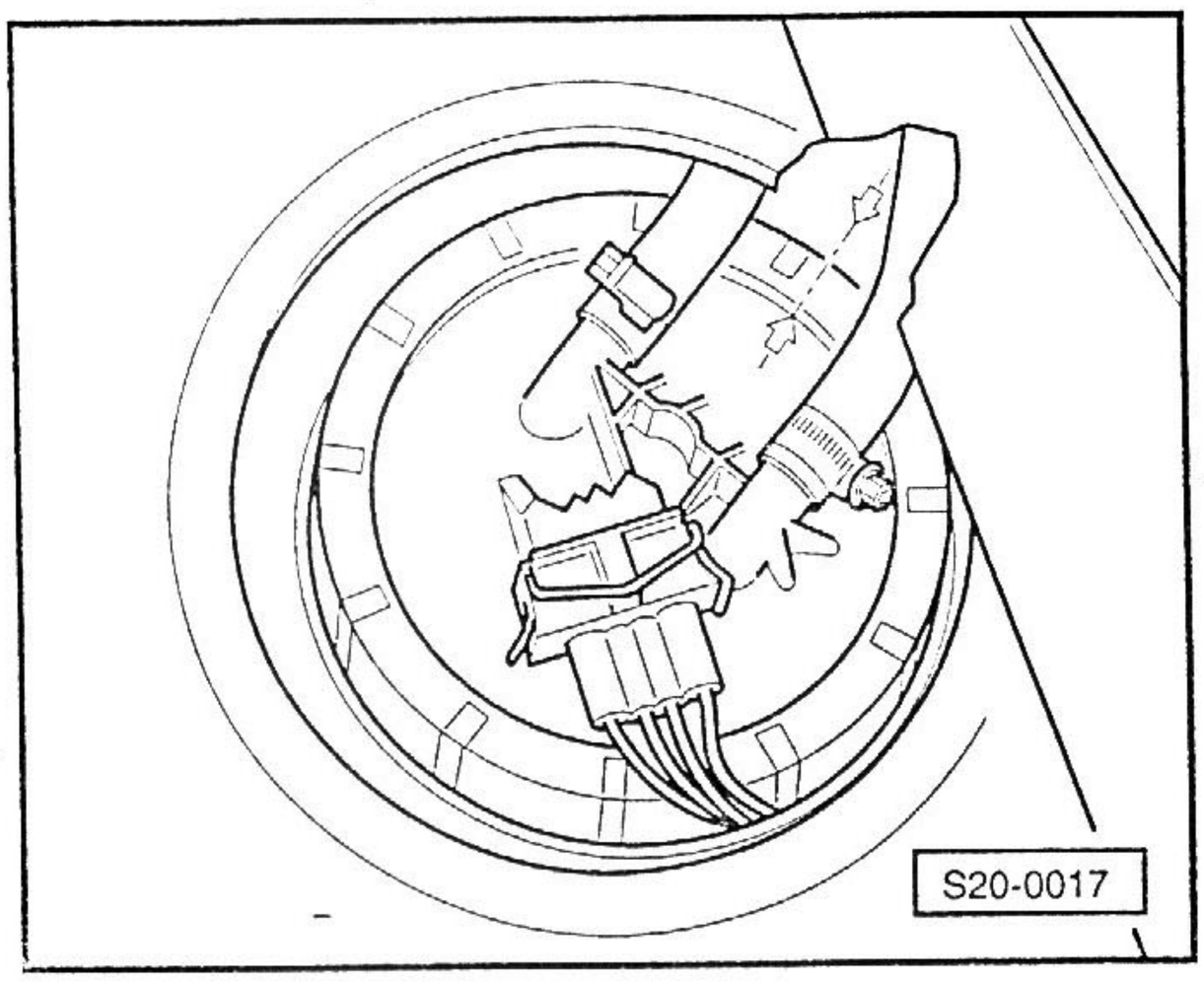
- Remove rear seat.

Note:

If vehicle fitted with split rear seat, remove only right-hand rear seat.

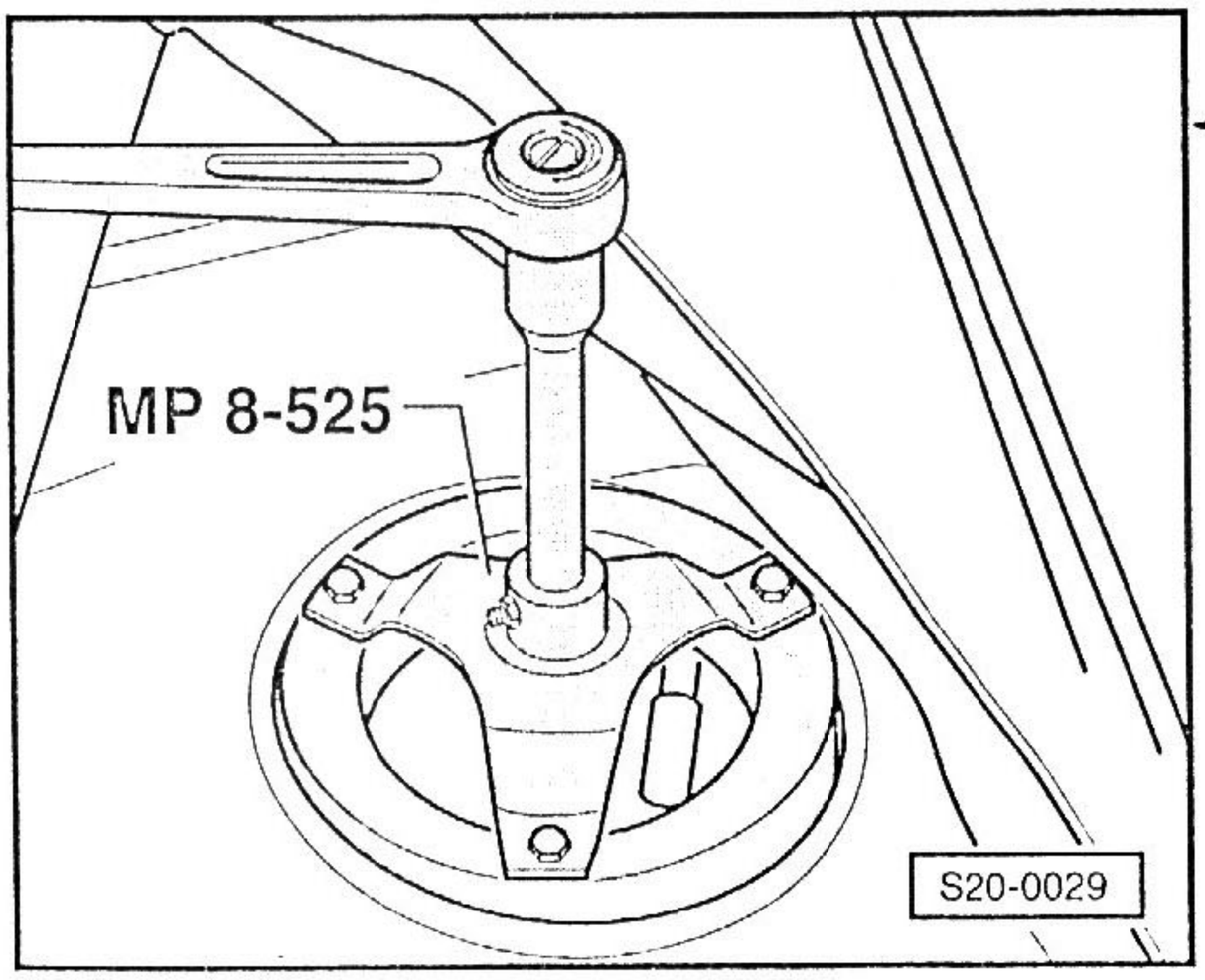
- Remove cover of boot floor.

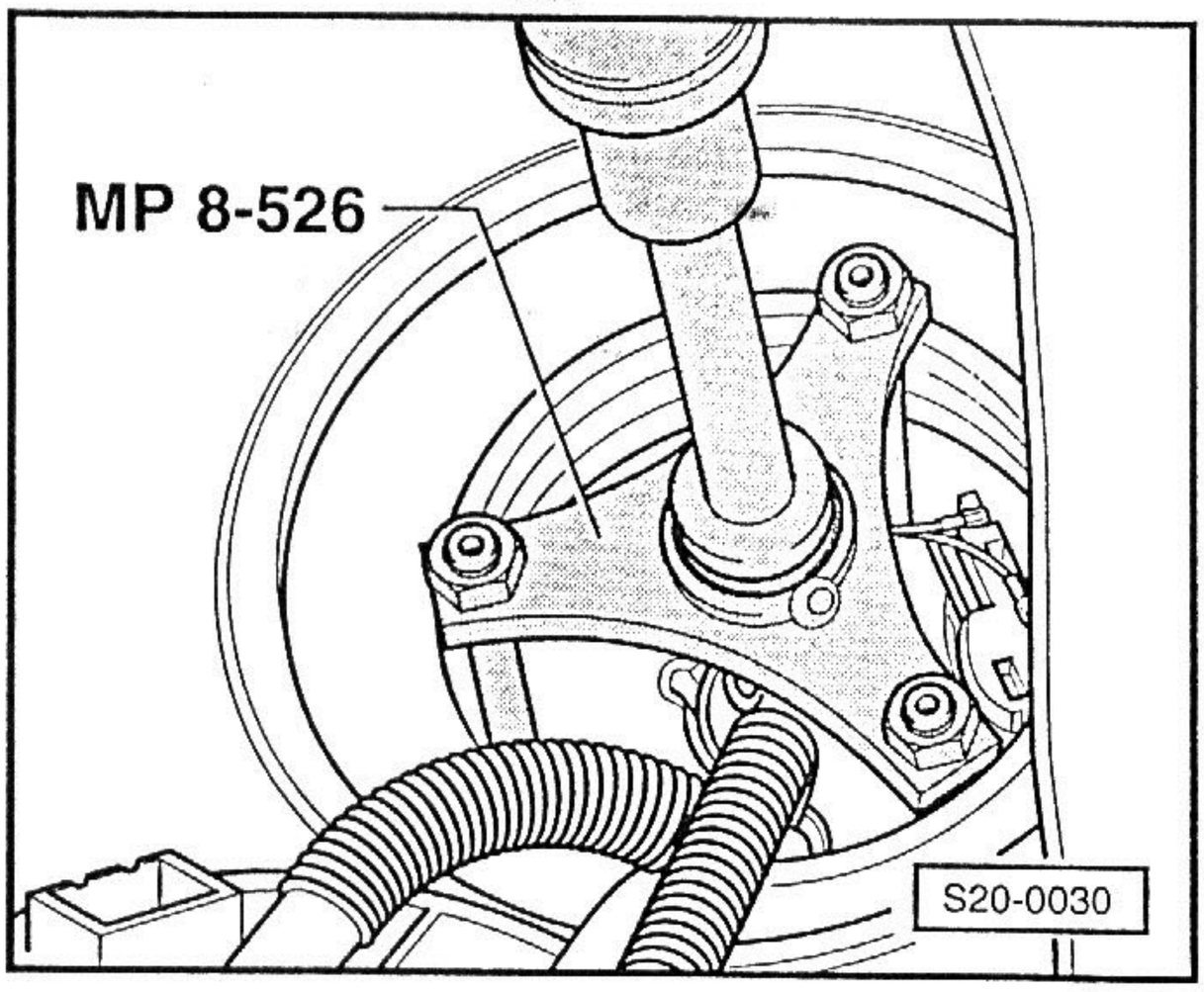
◀ - Unplug connectors and also feed and return flow pipes from the flange.



◀ - Use wrench MP 8-525 to unscrew union nut.

- Pull flange and seal out of the opening of the fuel tank.





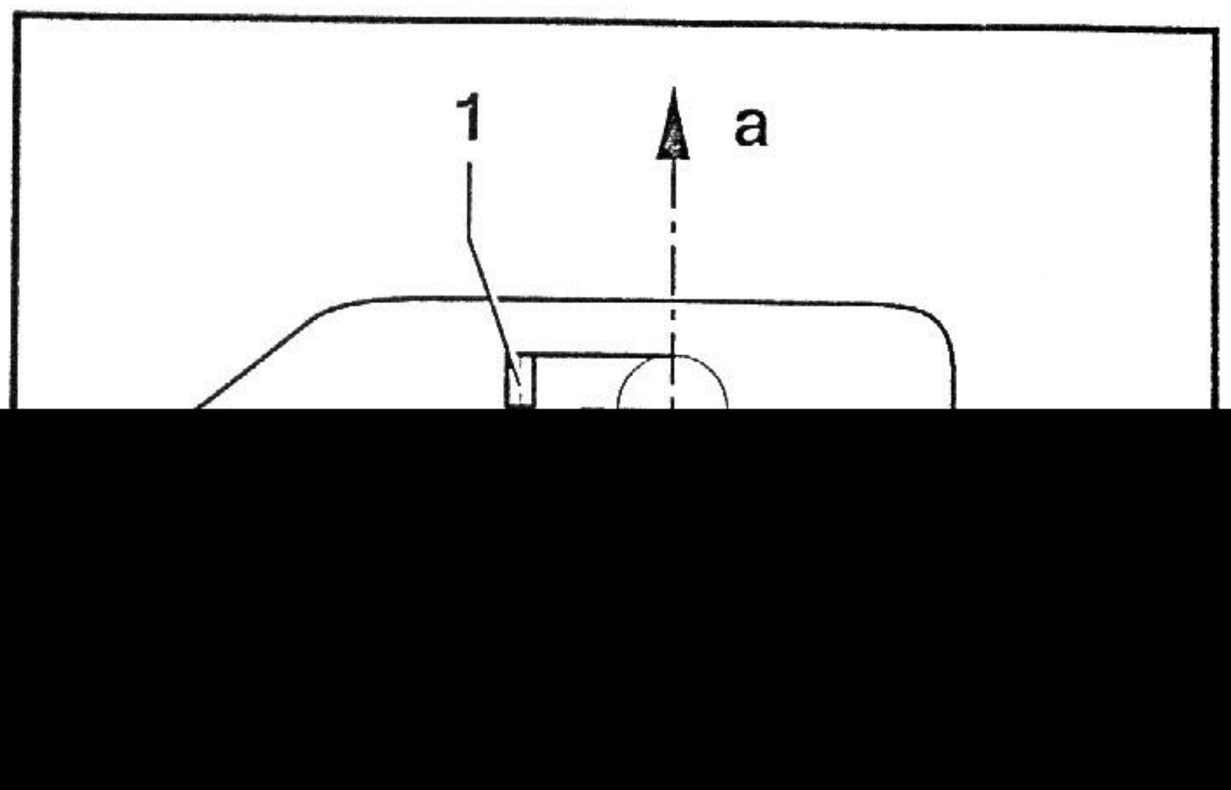
◄- Use assembly device MP 8-526 to detach delivery unit from the bayonet lock by turning to the left and then removing.

Note:

If the delivery unit is still filled with fuel, empty before replacing.

Installing

Installation of the fuel delivery unit is performed in the reverse order.



Notes:

- *When replacing the fuel delivery unit, ensure that the fuel gauge sender is not bent._*
- ◄ *If the fuel delivery unit is correctly installed, the float of the fuel gauge -1- is facing 90° to direction of travel -a-.*
- *Moisten seal of the flange with fuel for installing.*
- *Installation position of flange of*

Testing fuel pump

Models with fuel injection system

Special tools, testers and aids required

- Remove control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2
- Test cable V.A.G 1594/1 from adapter cable set V.A.G 1594
- Diode test lamp V.A.G 1527
- Current flow diagram
- Wrench MP 8-525
- Pressure measuring device V.A.G 1318
- Adapters V.A.G 1318/1/10/11
- Measuring vessel

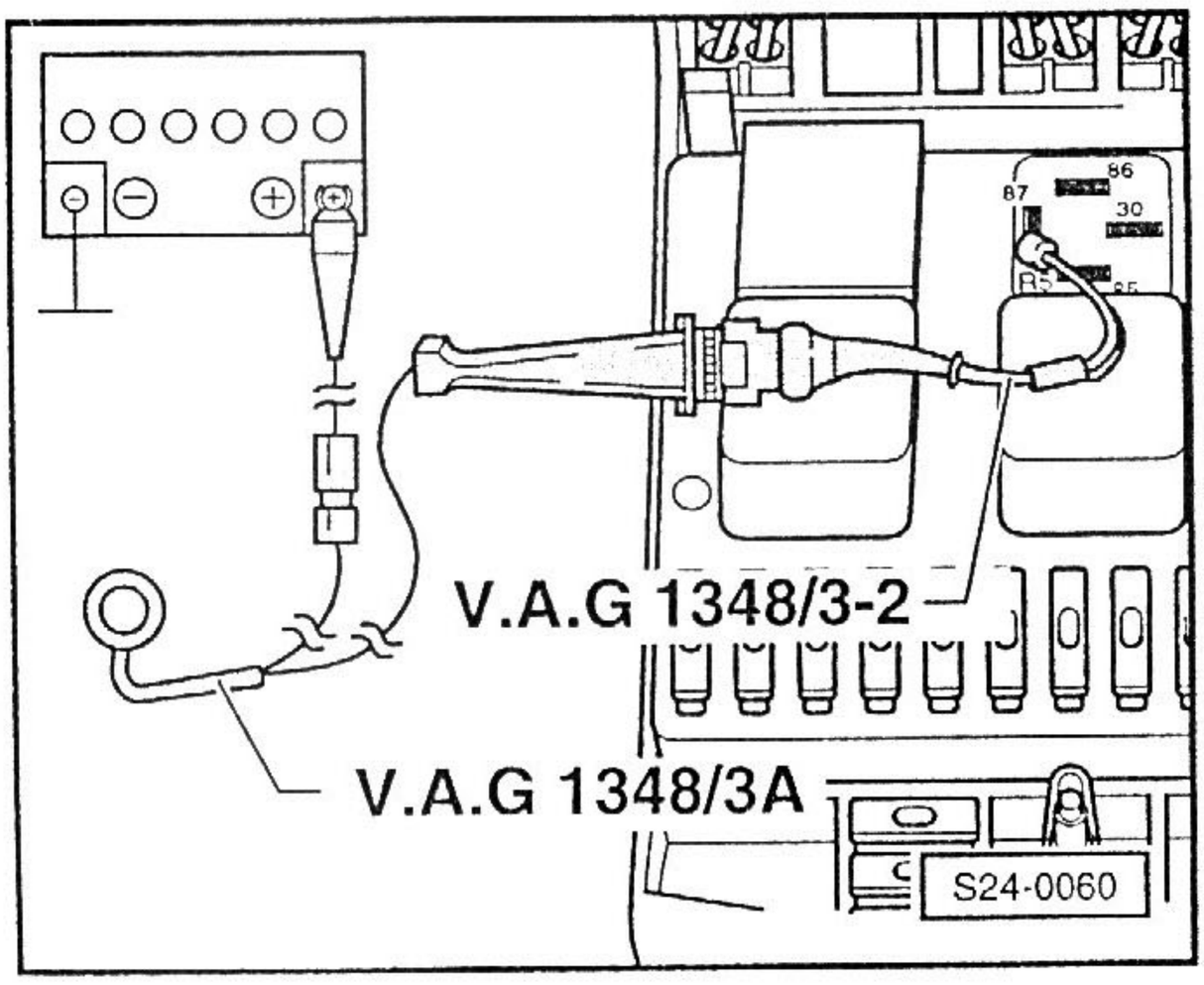
Test conditions

- Battery voltage o.k.
- Fuse 4 o.k.

Test procedure

- Switch on ignition.

Fuel pump should be heard to run briefly.

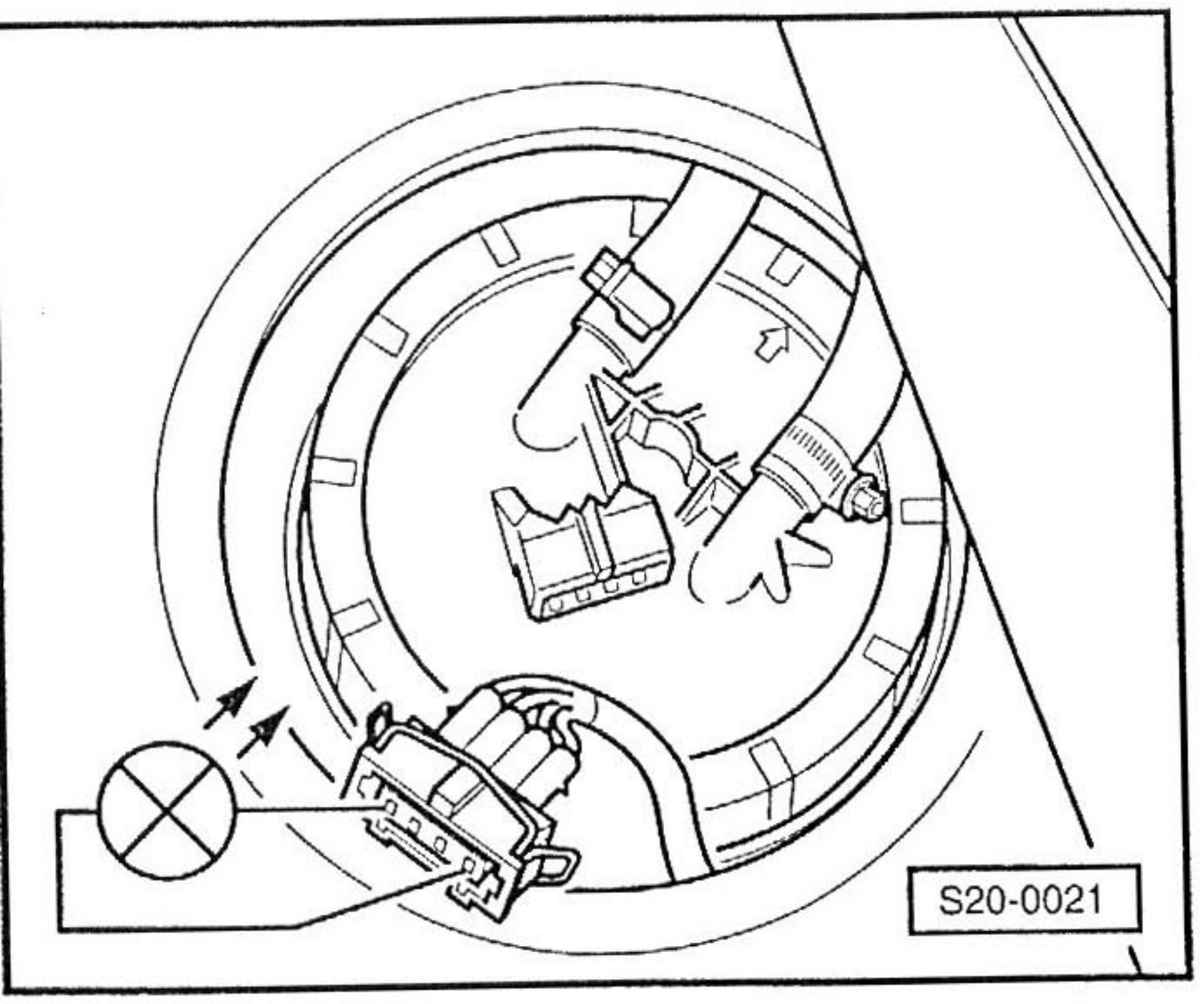


If the fuel pump does not operate:

- Switch off ignition.
- Remove fuel pump relay (J17) from the relay plate (relay position R5).
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 to contact 87 and to battery positive (+).
- Operate remote control.

Fuel pump runs:

- Test actuation of the fuel pump relay ⇒ Mono-Motronic or Simos 2P fuel injection and ignition system; repair group 24; Testing fuel pump relay.



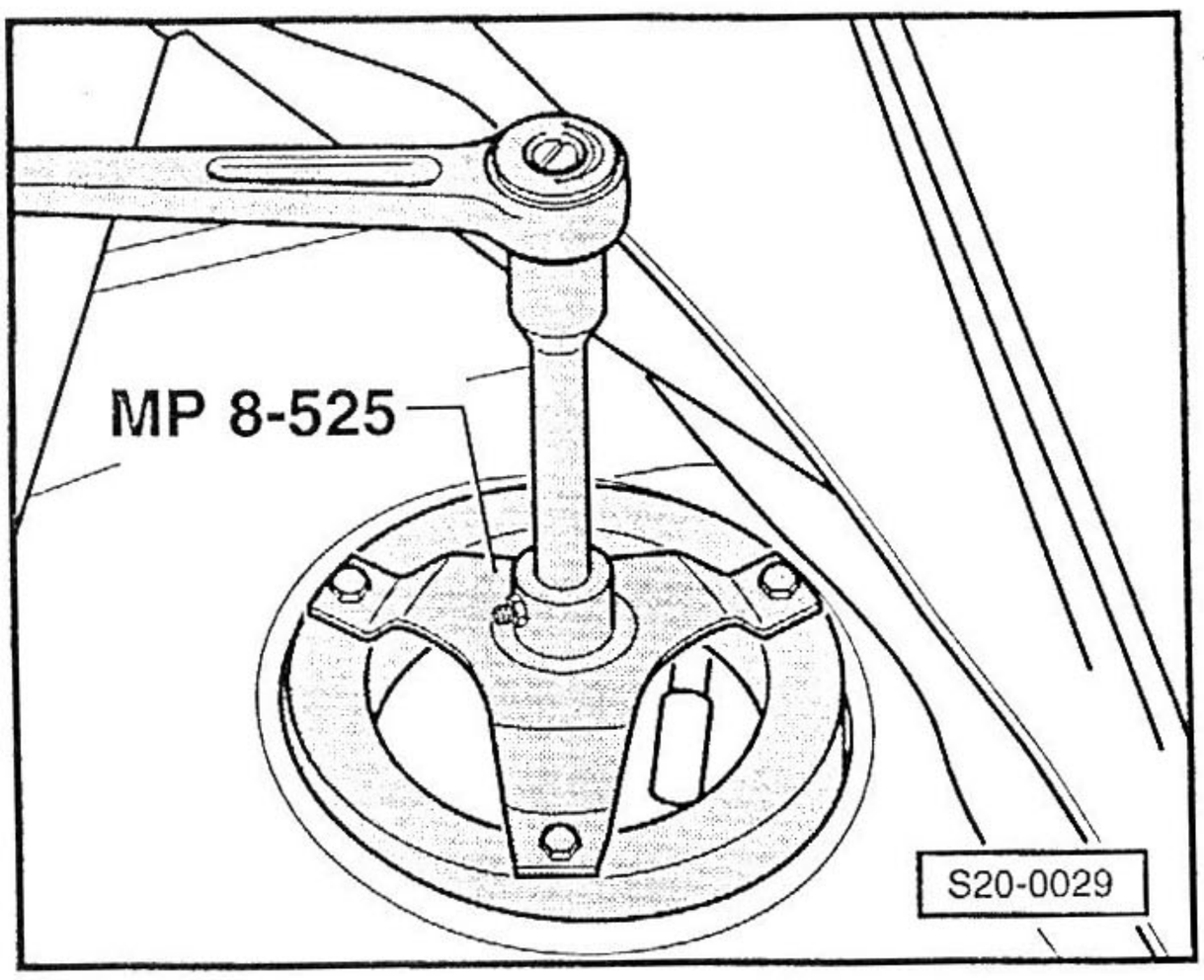
Fuel pump does not run:

- Fold rear seat forward.
- Remove cover of boot floor.
- Unplug connector from the flange at the fuel tank.
- ◄ - Connect the diode test lamp V.A.G 1527 with test cables V.A.G 1594/1 to the outer contacts of the connector.
- Operate remote control: LED should come on.

LED does not come on:

- Locate open circuit in wiring on the basis of current flow diagram and rectify.

LED comes on (voltage supply o.k.):



- ◄ - Use wrench MP 8-525 to unscrew union nut.
- Check whether the electric wiring between the flange and fuel pump is connected.

If no open circuit in the wiring can be found:

- Replace fuel delivery unit.

Notes:

- *Moisten seal of the flange with fuel for installing.*
- *Installation position of the flange of fuel delivery unit ⇒ page 20-8, Fig. 1.*

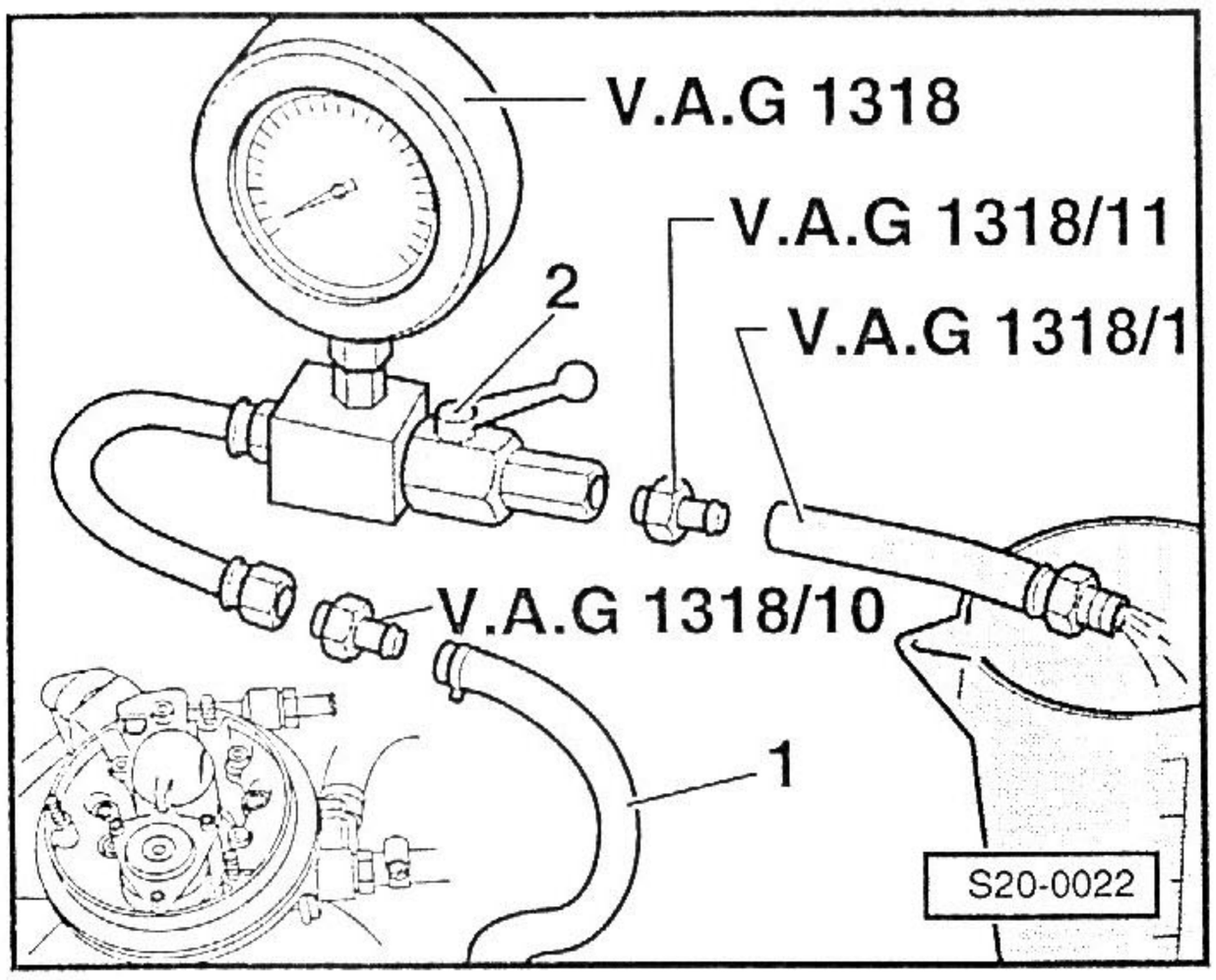
Testing delivery

Test conditions

- Voltage supply o.k.
- Remote control V.A.G 1348/3A connected.

Test procedure for models with Mono-Motronic

- Remove fuel filler cap from fuel filler neck.
- Remove air filter.



◄ - Disconnect fuel pipe -1- at the fuel injection unit.

- Connect pressure measuring device V.A.G 1318 with adapter 1318/10 to the fuel feed pipe -1-.

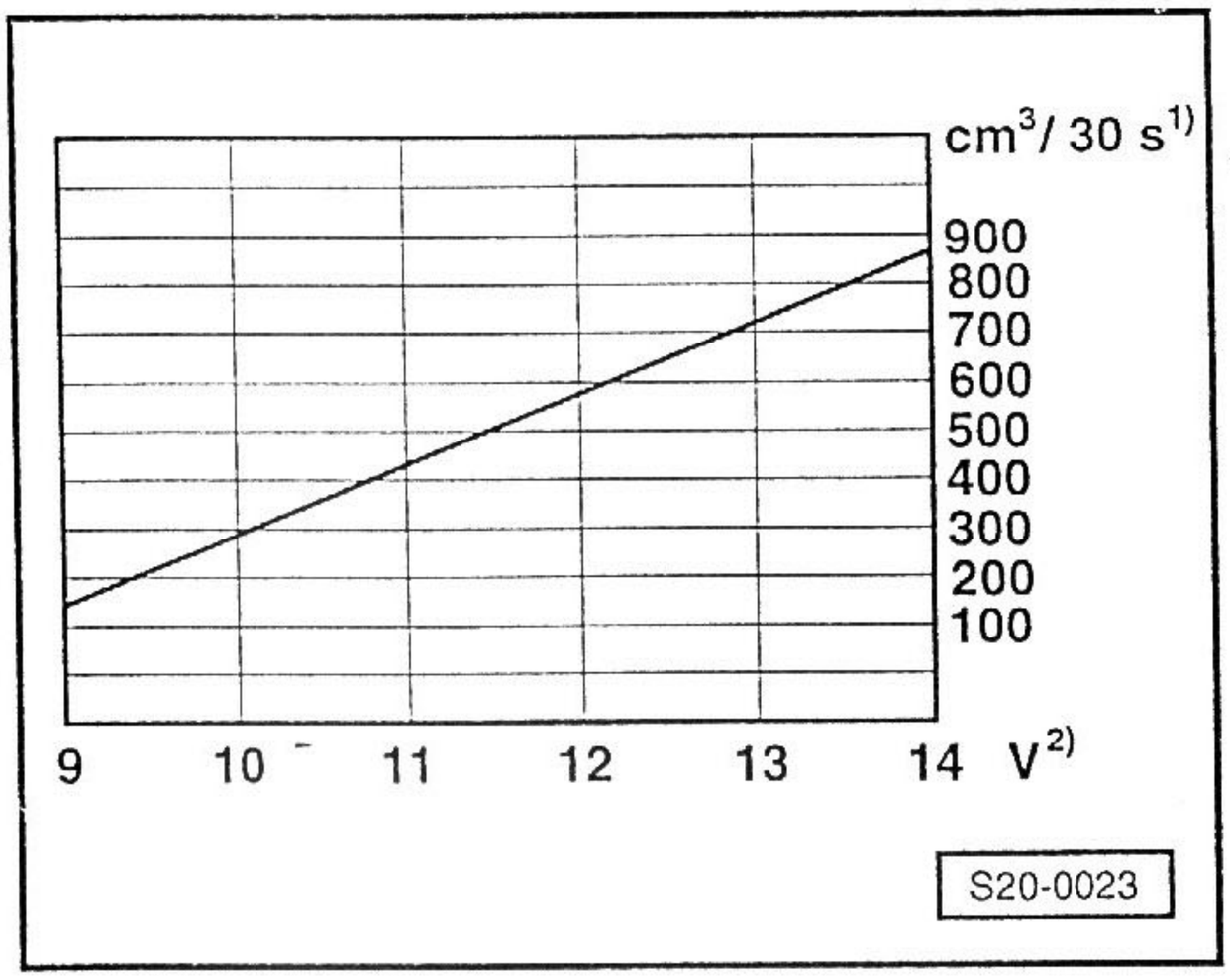
- Fit hose V.A.G 1318/1 onto adapter V.A.G 1318/11 of the pressure measuring device -2- and hold in measuring vessel.

- Open the shutoff cock of the pressure measuring device (lever in direction of flow).

- When the remote control V.A.G 1348/3A is operated, slowly close shutoff cock until a pressure of 1.2 bar (0.12 MPa) is indicated on the gauge. Do not alter the position of the shutoff cock after this.

- Empty measuring vessel.

- Operate remote control for 30 seconds and at the same time open shutoff cock.



◄ - Compare quantity of fuel pumped with specification.

1) Minimum delivery cm³/30 s

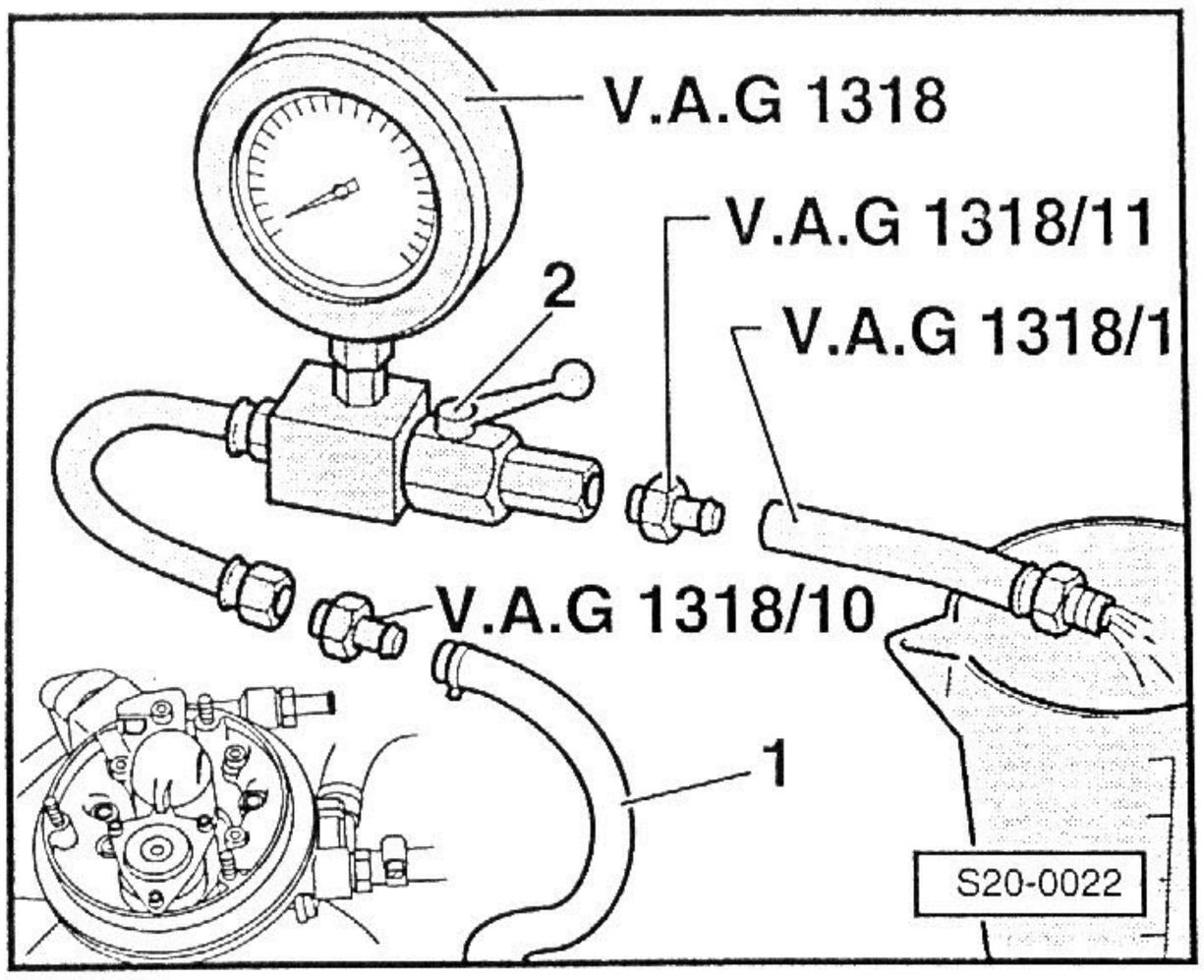
2) Voltage at fuel pump when engine not running and pump operating (about 2 V less than battery voltage).

If the minimum delivery is not achieved:

- Fuel pipes kinked or blocked
- Fuel filter blocked
- Fuel pump faulty; replace fuel delivery unit

Testing non-return valve of fuel pump on models with Mono-Motronic

- Remote control V.A.G 1348/3A connected.
- Pressure measuring device V.A.G 1318 connected.



Note:

When carrying out this test, the connections of the fuel feed pipe from the fuel delivery unit to the connection point of the pressure measuring device V.A.G 1318 are also checked for leaks.

◄ - Close shutoff cock of pressure measuring device -2- (lever at right angles to direction of flow).

- Operate remote control at brief intervals until a pressure of about 2 bar (0.2 MPa) has been built up.

- If the pressure build-up is too high, reduce pressure by carefully opening the shutoff cock.

Important!

Risk of spraying when opening shutoff cock; hold vessel in front of free connection of pressure measuring device.

- Check the pressure drop. Pressure must not drop below 1.2 bar (0.12 MPa) within 10 minutes.

If pressure drops below 1.2 bar (0.12 MPa):

- Inspect pipe connections for leaks or replace fuel delivery unit.

If minimum delivery and required pressure are achieved but the problem still exists:

- Test fuel pressure regulator and pressure in fuel supply system ⇒ Mono-Motronic fuel injection and ignition system; repair group 24; Testing fuel pressure regulator and pressure in fuel supply system.

Test procedure for models with Simos 2P

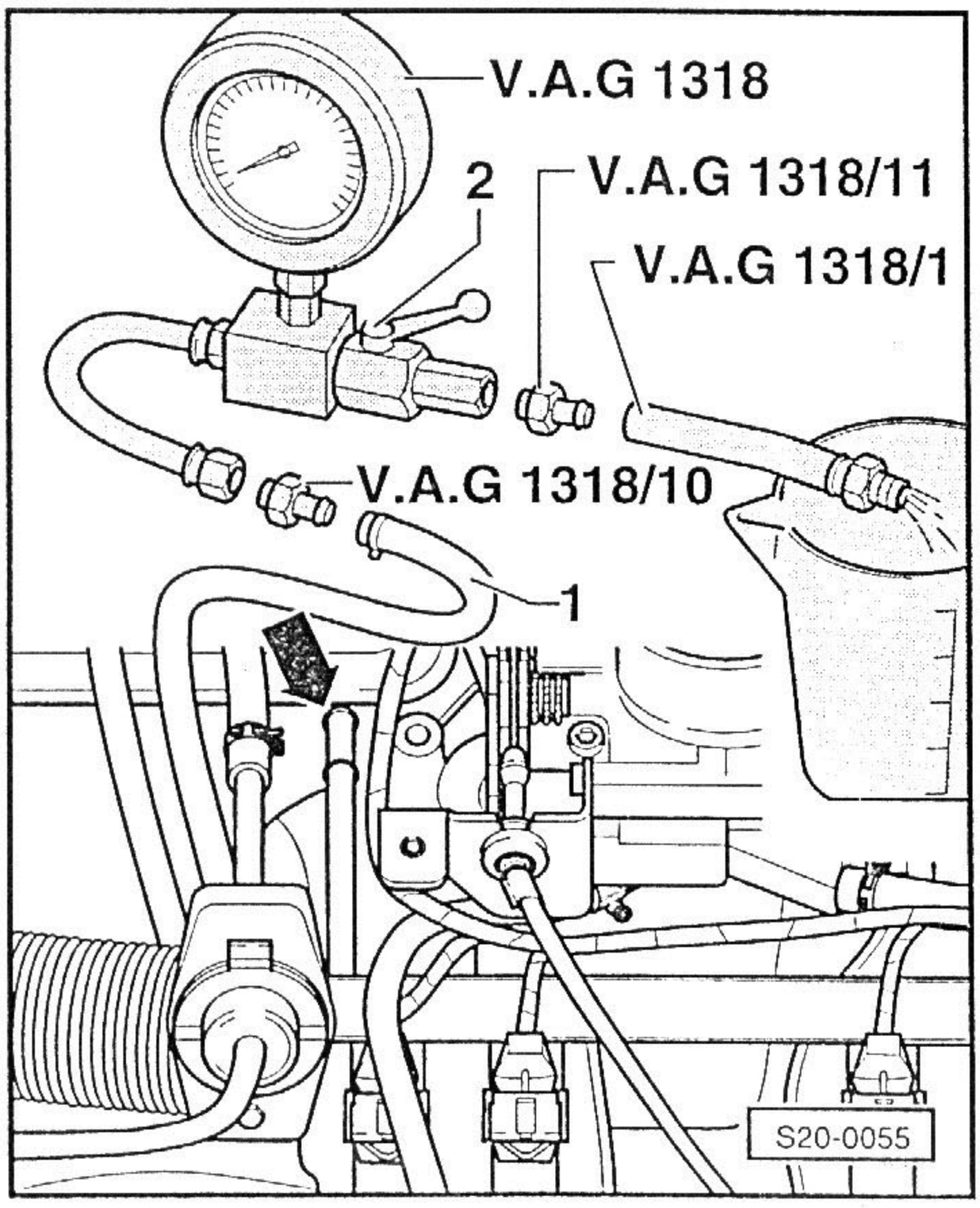
- Remove cover of throttle valve unit and intake pipe.

- Remove intake hose.

- Remove fuel filler cap from fuel filler neck.

◄ - Disconnect fuel pipe -1- at the fuel injection unit -arrow-.

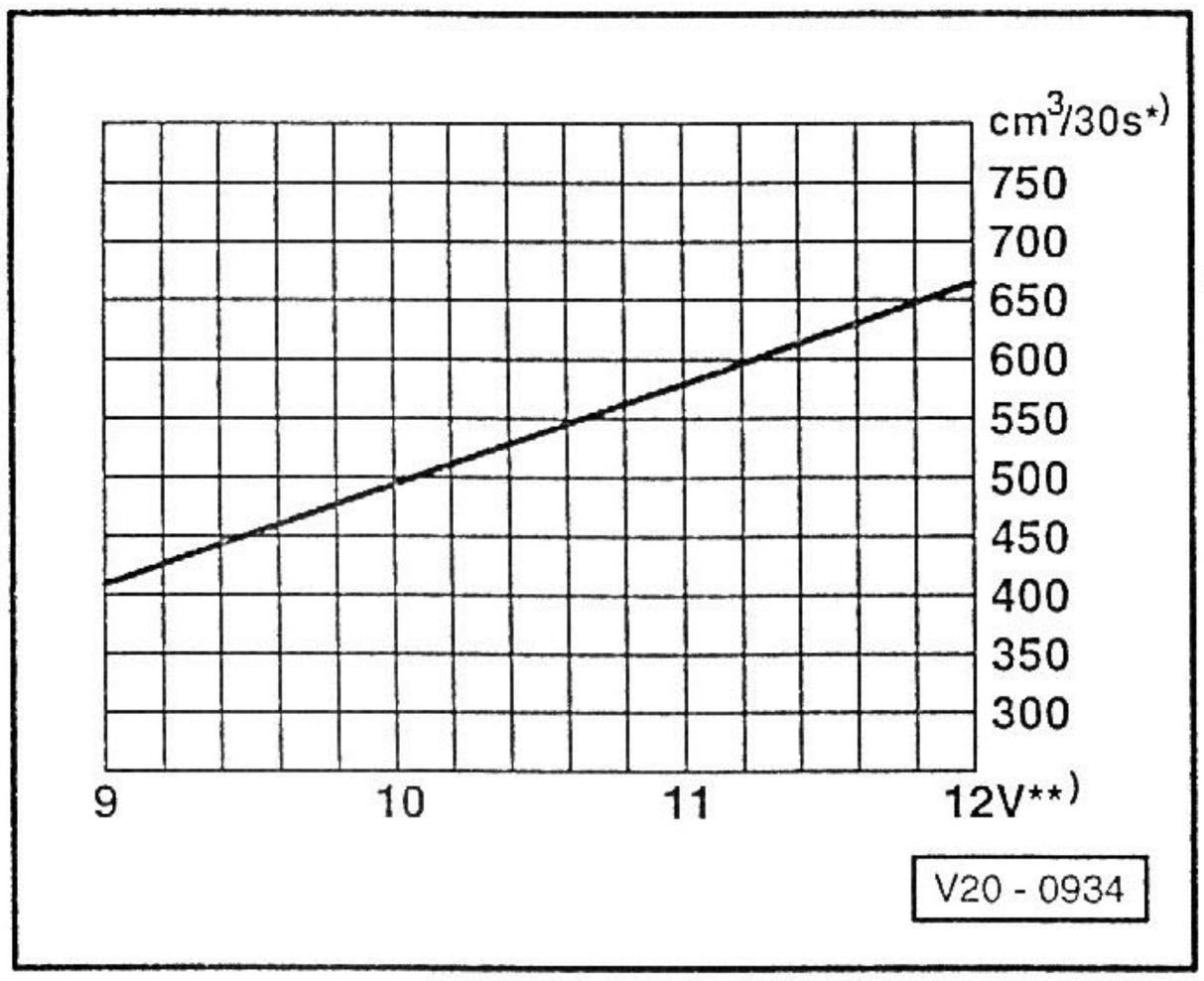
- Connect pressure measuring device V.A.G 1318 with adapter 1318/10 to the fuel feed pipe -1-.



- Fit hose V.A.G 1318/1 onto adapter V.A.G 1318/11 of the pressure measuring device and hold in measuring vessel.

- Open the shutoff cock of the pressure measuring device (lever in direction of flow).

- When the remote control V.A.G 1348/3A is operated, slowly close shutoff cock until a pressure of 3 bar (0.3 MPa) is indicated on the gauge. Do not alter the position of the shutoff cock after this.



- Empty measuring vessel.

- Operate remote control for 30 seconds and at the same time open shutoff cock.

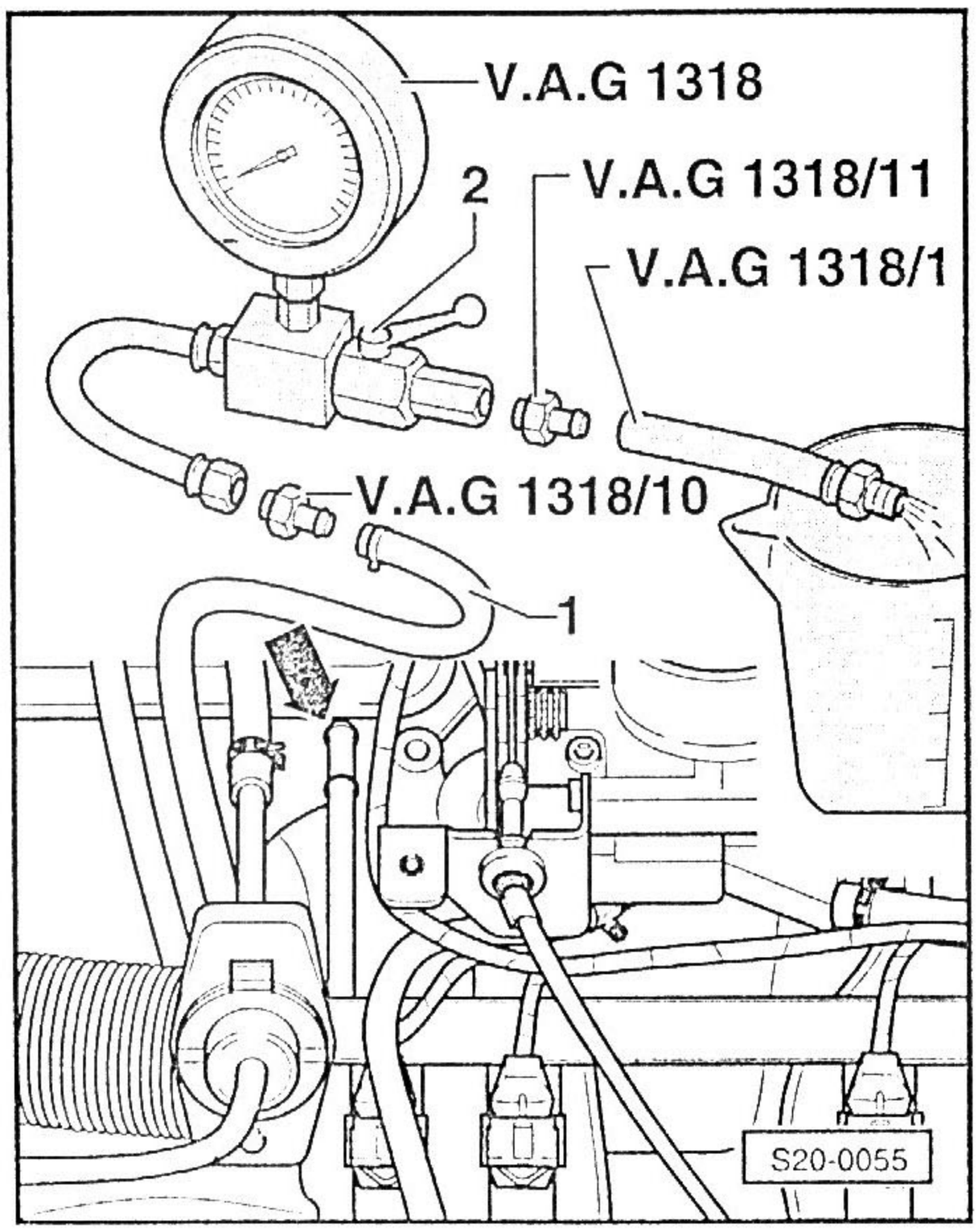
◀ - Compare quantity of fuel pumped with specification.

*) Minimum delivery cm^3/30 s

**) Voltage at fuel pump when engine not running and pump operating (about 2 V less than battery voltage).

If the minimum delivery is not achieved:

- Fuel pipes kinked or blocked
- Fuel filter blocked
- Fuel pump faulty; replace fuel delivery unit



Testing non-return valve of fuel pump on models with Simos 2P

Test procedure

- Remote control V.A.G 1348/3A connected.

- Pressure measuring device V.A.G 1318 connected.

Note:

When carrying out this test, the connections of the fuel feed pipe from the fuel delivery unit to the connection point of the pressure measuring device V.A.G 1318 are also checked for leaks.

◀ - Close shutoff cock of pressure measuring device -2- (lever at right angles to direction of flow).

- Operate remote control at brief intervals until a pressure of about 3 bar (0.3 MPa) has been built up.

- If the pressure build-up is too high, reduce pressure by carefully opening the shutoff cock.

Important!

Risk of spraying when opening shutoff cock; hold vessel in front of free connection of pressure measuring device.

- Check the pressure drop. Pressure must not drop below 2 bar (0.2 MPa) within 10 minutes.

If pressure drops below 2 bar (0.2 MPa):

- Inspect pipe connections for leaks or replace fuel delivery unit.

- Test fuel pressure regulator and pressure in fuel supply system ⇒ Simos 2P fuel injection and ignition system; repair group 24; Testing fuel pressure regulator and pressure in fuel supply system.

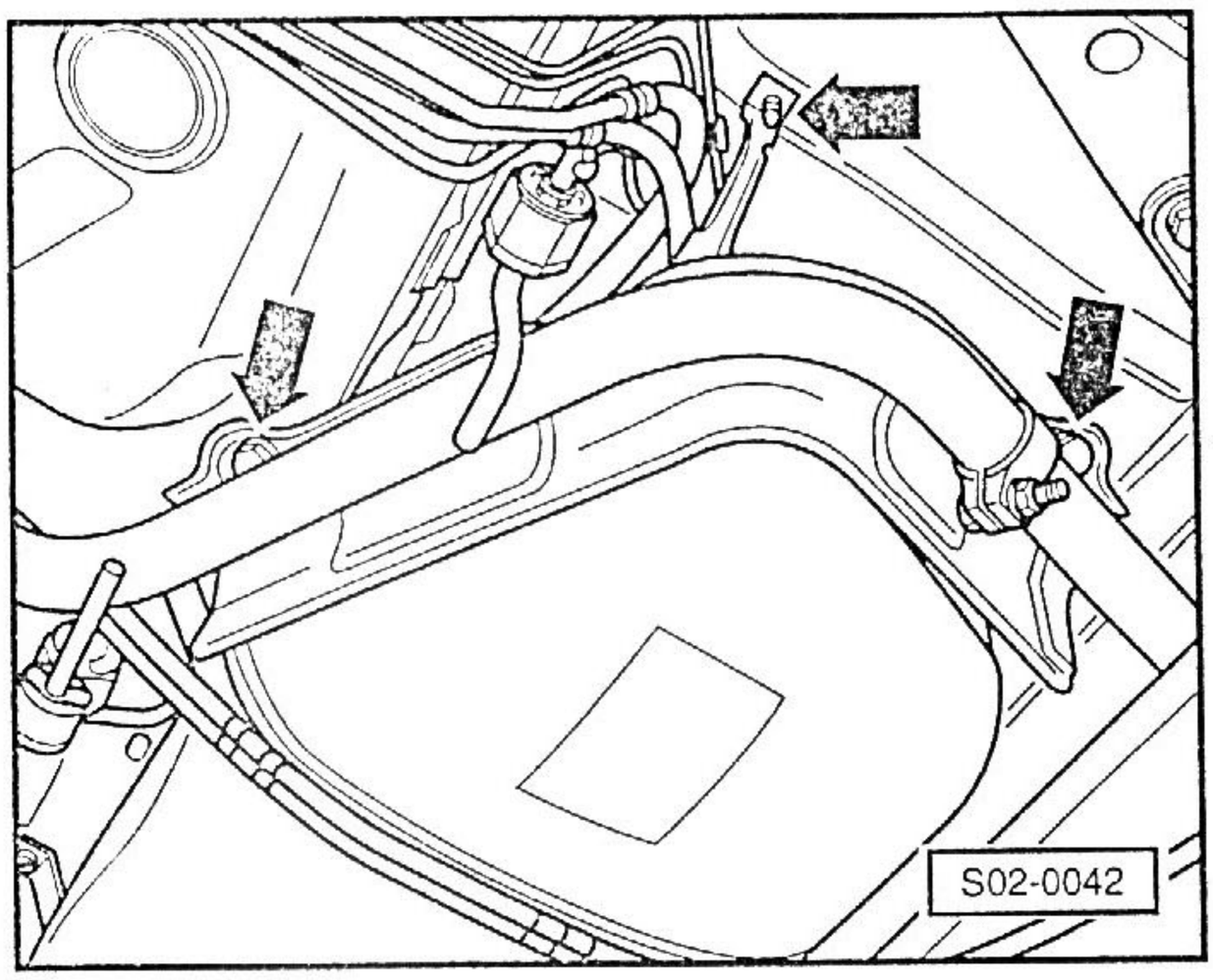
Replacing fuel filter

Models with fuel injection system

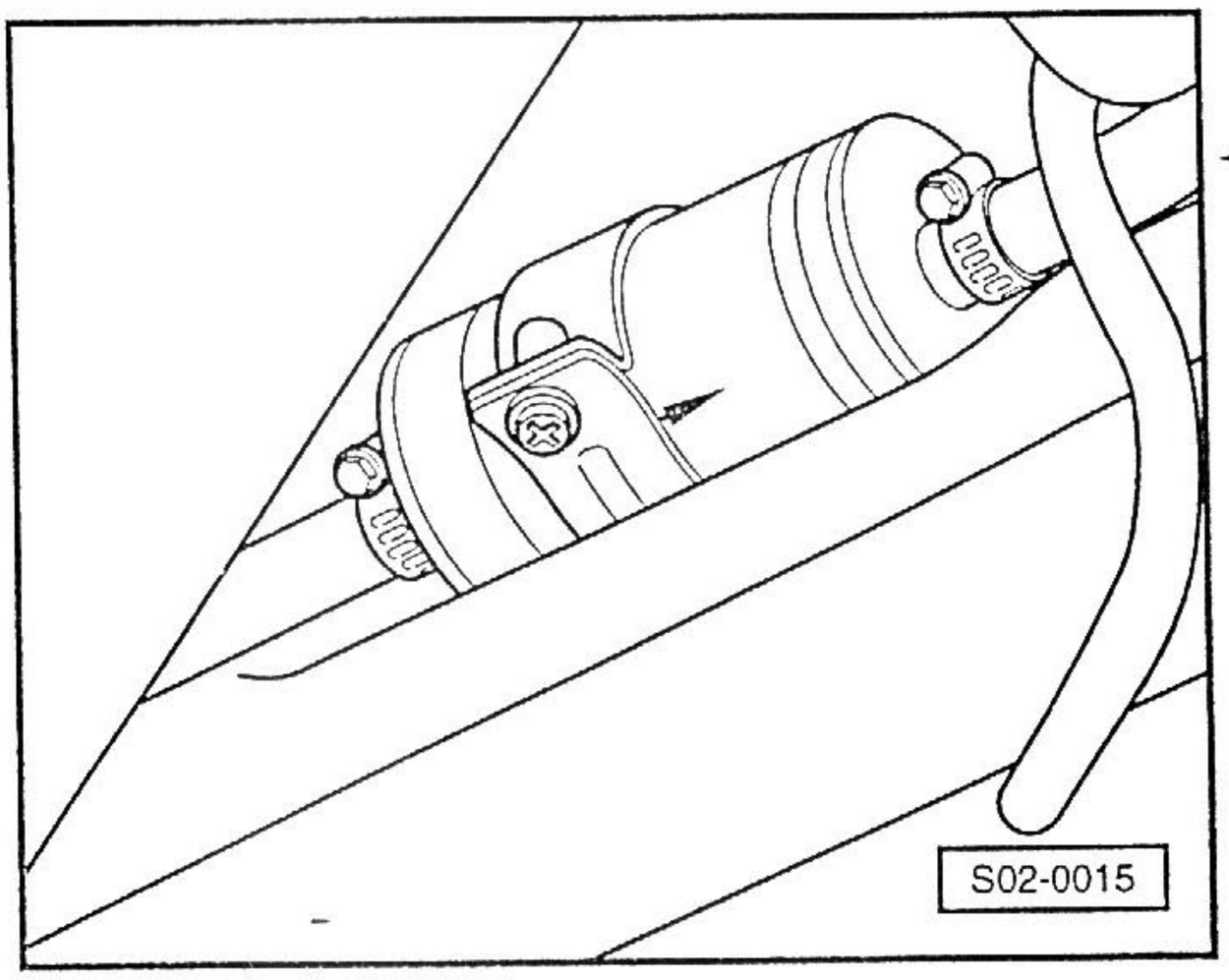
Models with carburettor engine ⇒ page 20-23.

Removing

- Pay attention to safety precautions ⇒ page 20-10.



◀- Remove the nuts securing the heat shield -arrows- and take out heat shield.



◀- Slacken the clips of the fuel pipe at the filter and detach pipes.

- Slacken the securing bar and take out filter.

Installing

Installation is performed in the reverse order; pay attention to the following points:

- When installing, pay attention to direction of flow; arrow on filter faces direction of flow.

- Secure hose connection points with screw-type clips.

- When inserting heat shield, ensure proper clearance to all the pipes and cables.

Models with carburettor engine

Removing

Note:

The fuel filter is located in the engine compartment in the area of the brake servo unit.

- Slacken screw-type hose clips and detach hoses from the fuel filter.

Installing

Installation is performed in the reverse order; pay attention to the following points:

- When installing, pay attention to direction of flow; arrow on filter faces direction of flow.

- Secure hose connection points with screw-type clips.

Removing and installing fuel tank

Special tools, testers and aids required

♦ Torque wrench e.g. V.A.G 1331 (5...50 Nm)

Removing

● Fuel tank not more than 1/3 filled.

- Pay attention to safety precautions
⇒ page 20-10.

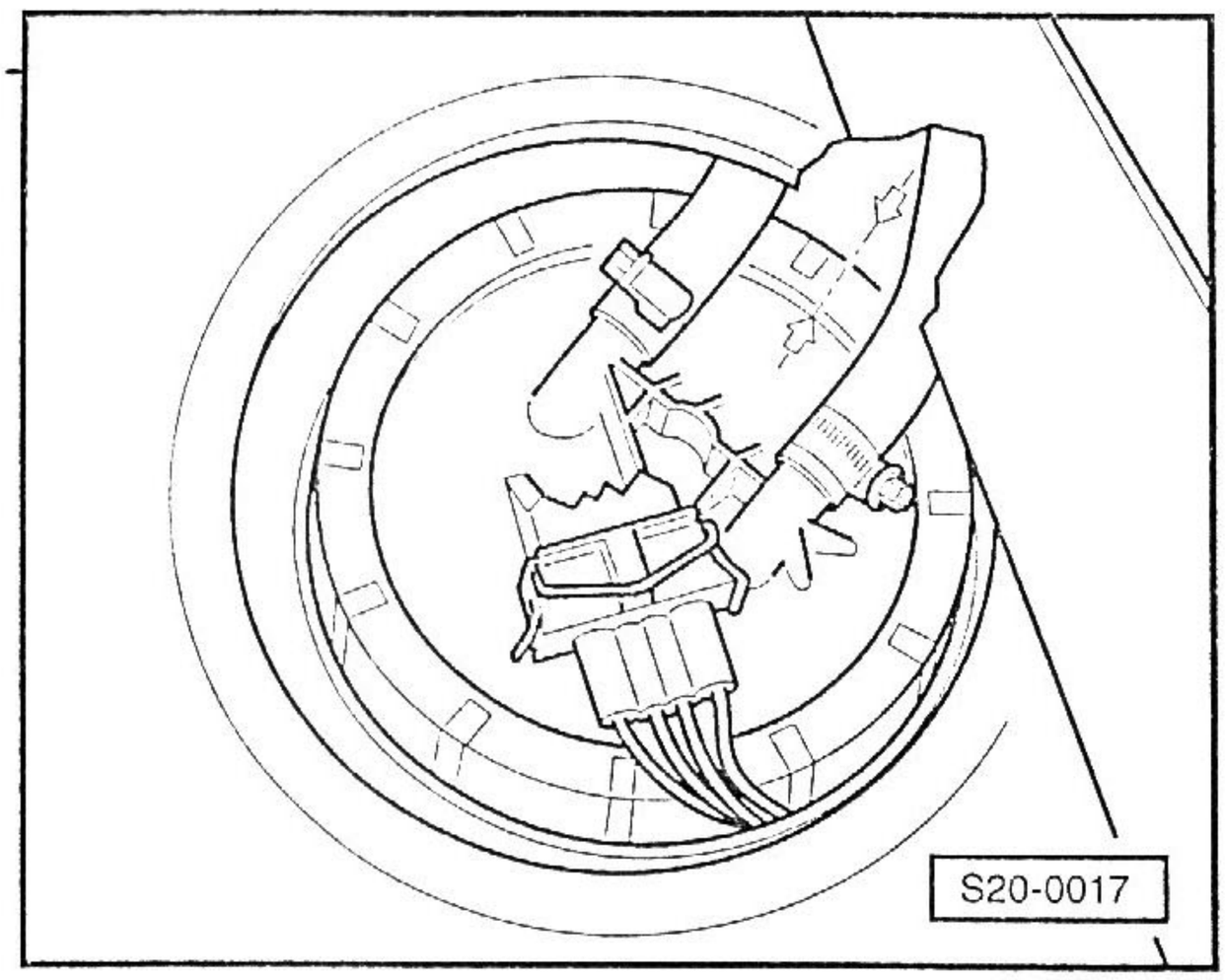
- Switch off ignition (if not already off) and disconnect earth strap at the battery.

Note:

If radio fitted with anti-theft code, determine code first of all.

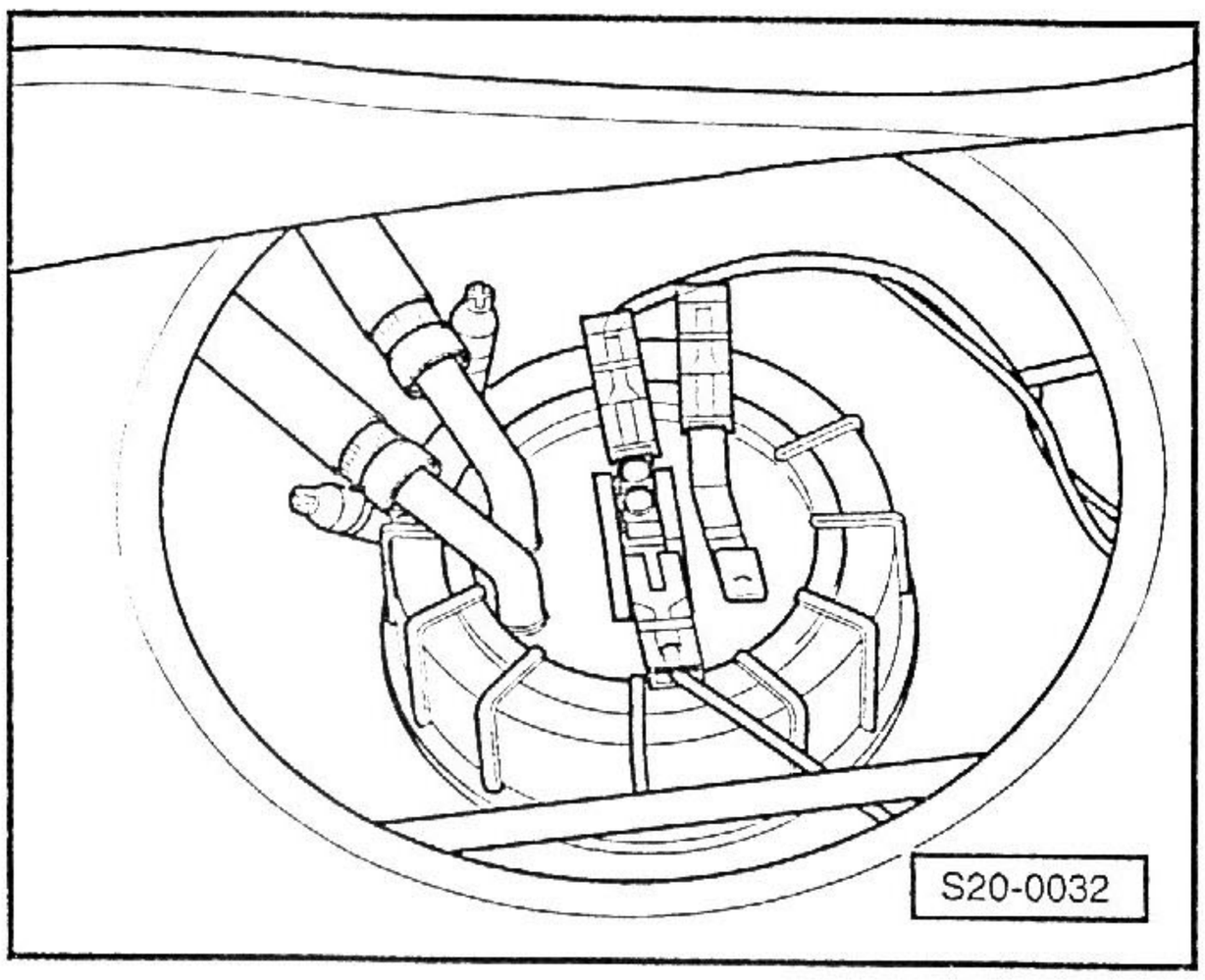
- Fold rear seat forward.

- Remove cover of boot floor.



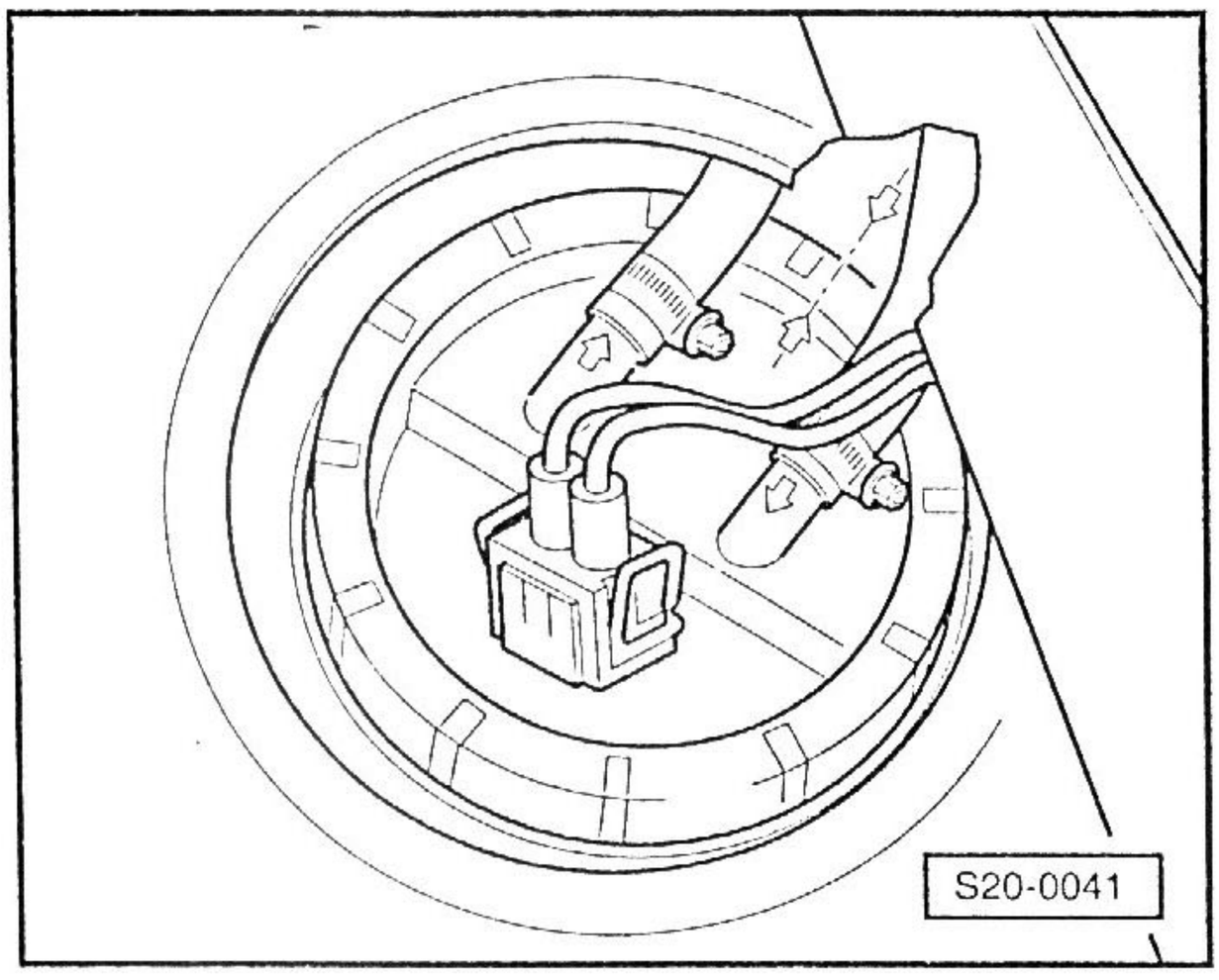
Models with fuel injection system

◀ - Unplug connector and also fuel feed and return flow pipes from the flange.



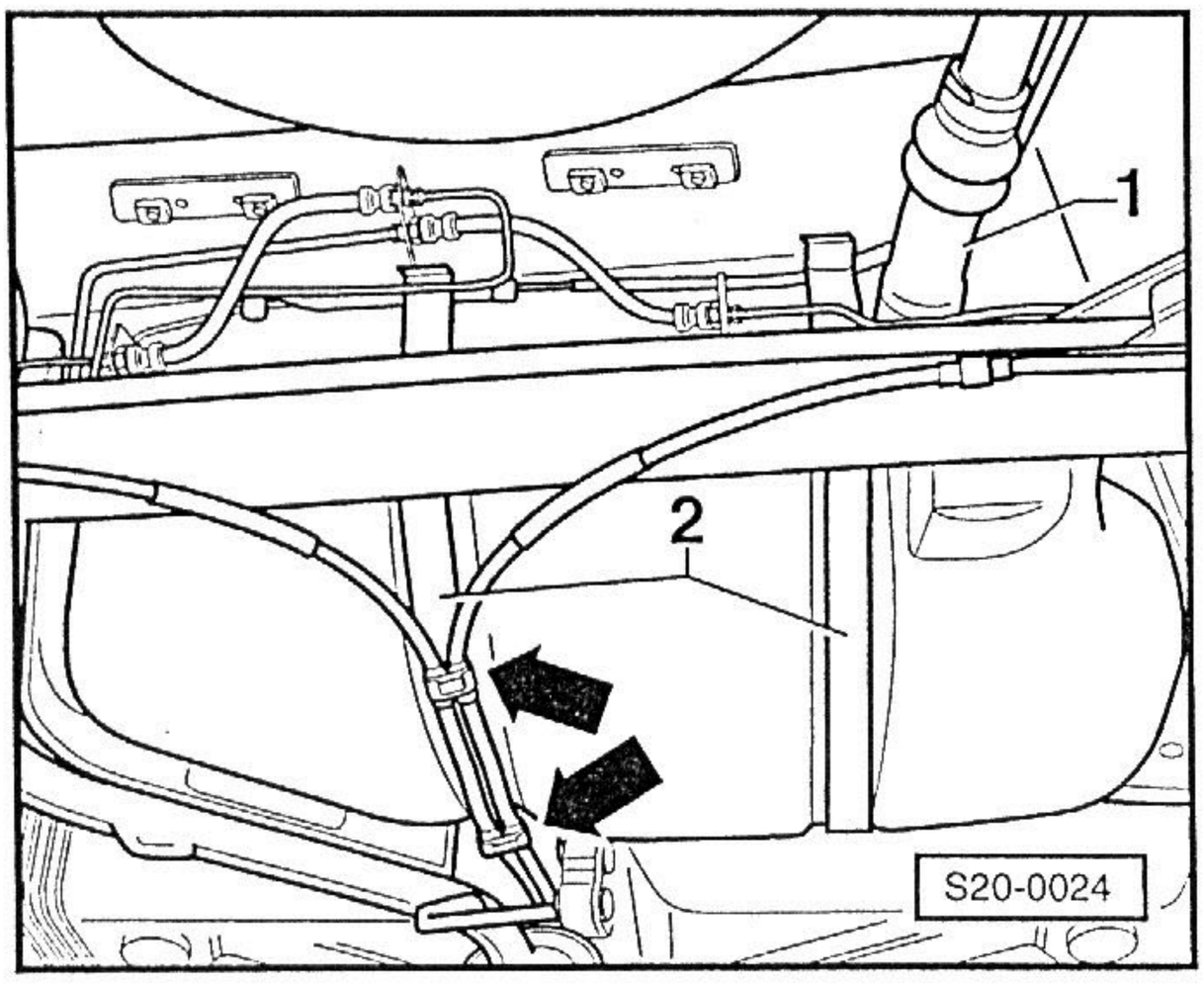
Models with carburettor engine

◀ - Unplug connectors and also feed and return flow pipes from the flange.



Models with carburettor engine 05.96 ➤

◀ - Unplug connectors and also feed and return flow pipes from the flange.



Continuation for all models

◀ – Release handbrake cable at the cable guide clips -arrows-.

– Detach connecting hose -1- at the fuel tank.

– Support fuel tank.

– Unbolt tensioning straps -2- and release.

– Lower fuel tank only far enough until the vent pipes at the fuel tank can be disconnected.

– Lower fuel tank.

Installing

Installation is performed in the reverse order; pay attention to the following points:

– Secure hose connections with clips.

– Pay attention to the different versions of the tensioning straps.

– Tighten securing bolts of the tensioning straps to
25 Nm.

-

Removing and installing filler neck reservoir

Special tools, testers and aids required

♦ Torque wrench e.g. V.A.G 1331 (5...50 Nm).

Removing

● Fuel tank filled not more than 1/3

– Pay attention to safety precautions ⇒ page 20-10.

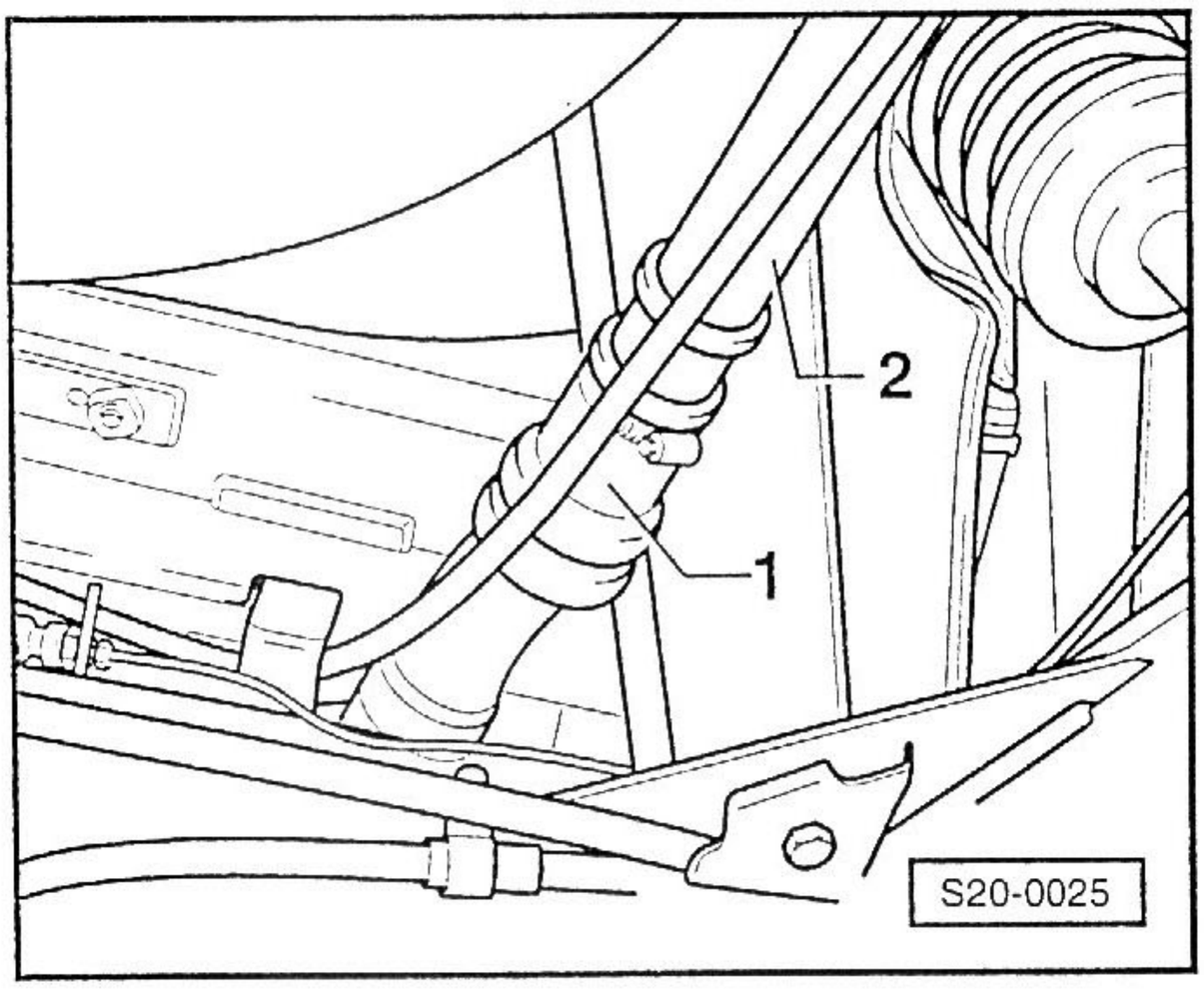
– Take off right rear wheel.

– Remove filler cap from fuel filler neck.

– Release tensioning ring for rubber bowl.

– Pull rubber bowl off fuel filler neck.

◀ – Pull off connecting hose -1- at the filler pipe -2-.



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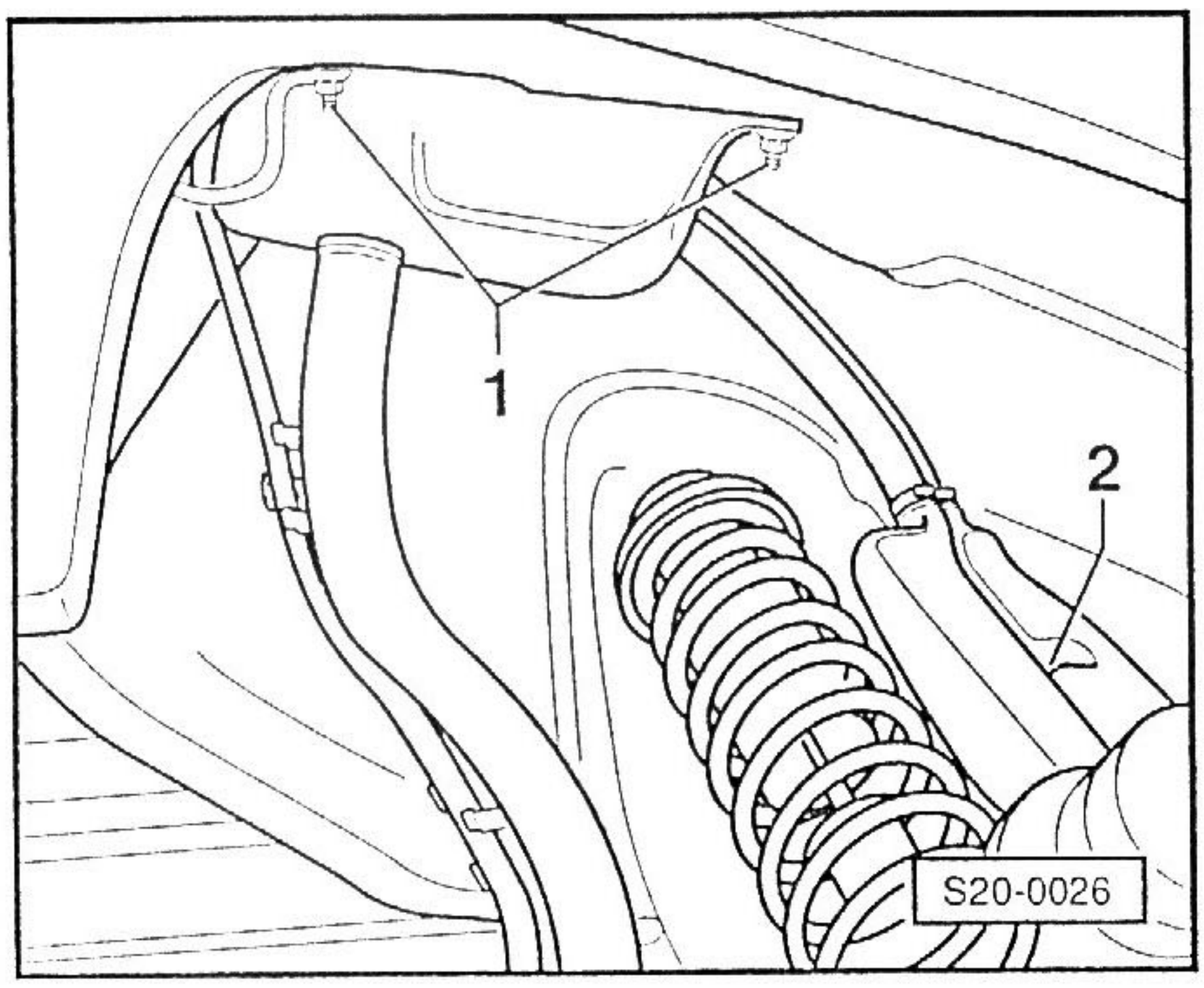


◀ – Unscrew securing nut -2- of the expansion tank.

– Unscrew securing nuts -1- of the filler neck reservoir.

– Lower filler neck reservoir.

– Unclip gravity valve and detach vent hoses.

Installing

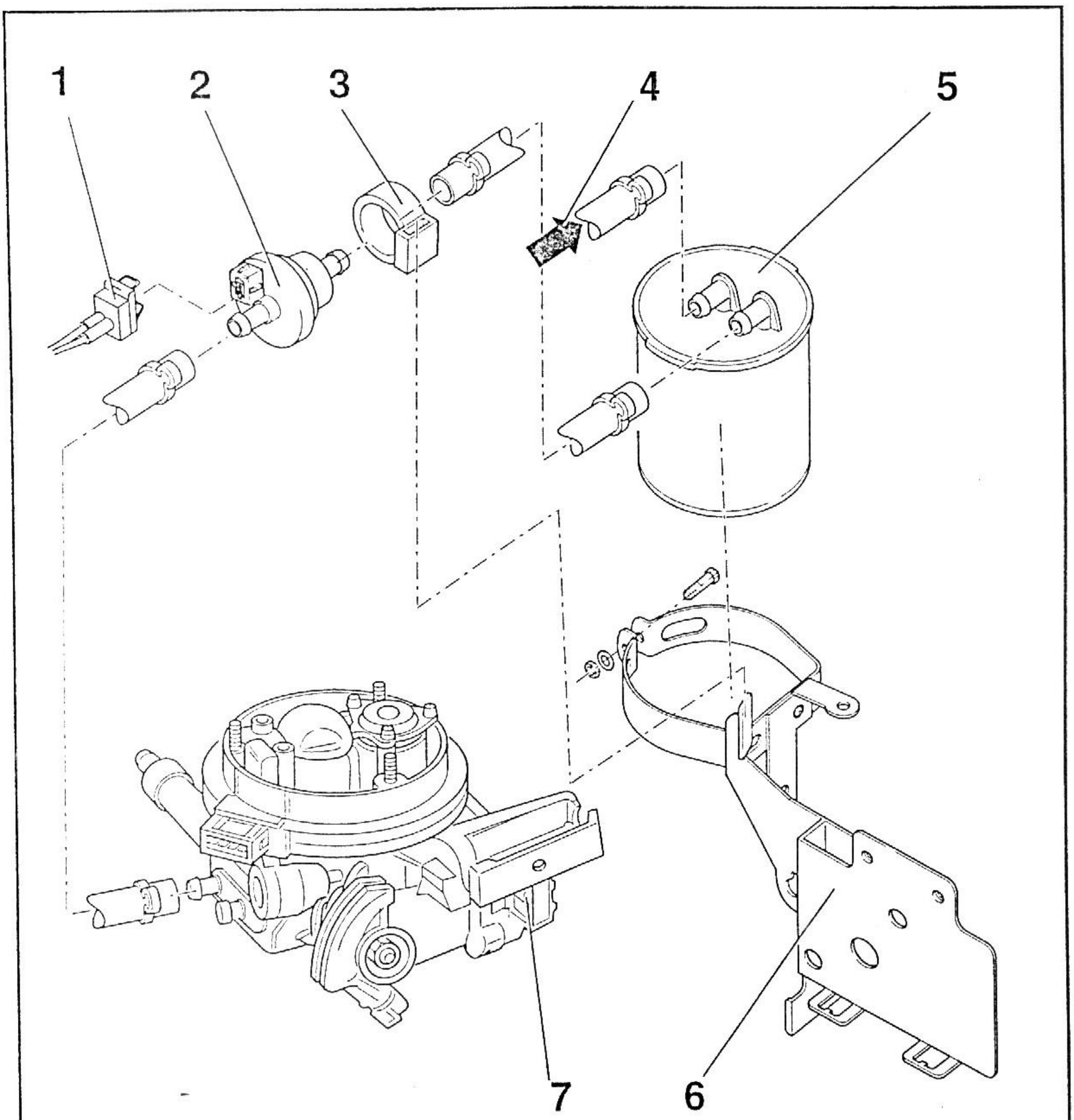
Installation is performed in the reverse order; pay attention to the following points:

- Tighten securing nuts of the filler neck and expansion tank to
  10 Nm.

- Secure hose connections with clips.

Removing and installing parts of the activated charcoal filter system

-



Models with Mono-Motronic

1 - Connector

2 - Solenoid valve 1 (N80)
- ♦ Valve is actuated (pulsed) by the Mono-Motronic control unit when engine warm
- ♦ Testing
- ⇒ Repair Group 01; Self-Diagnosis, Final Control Diagnosis

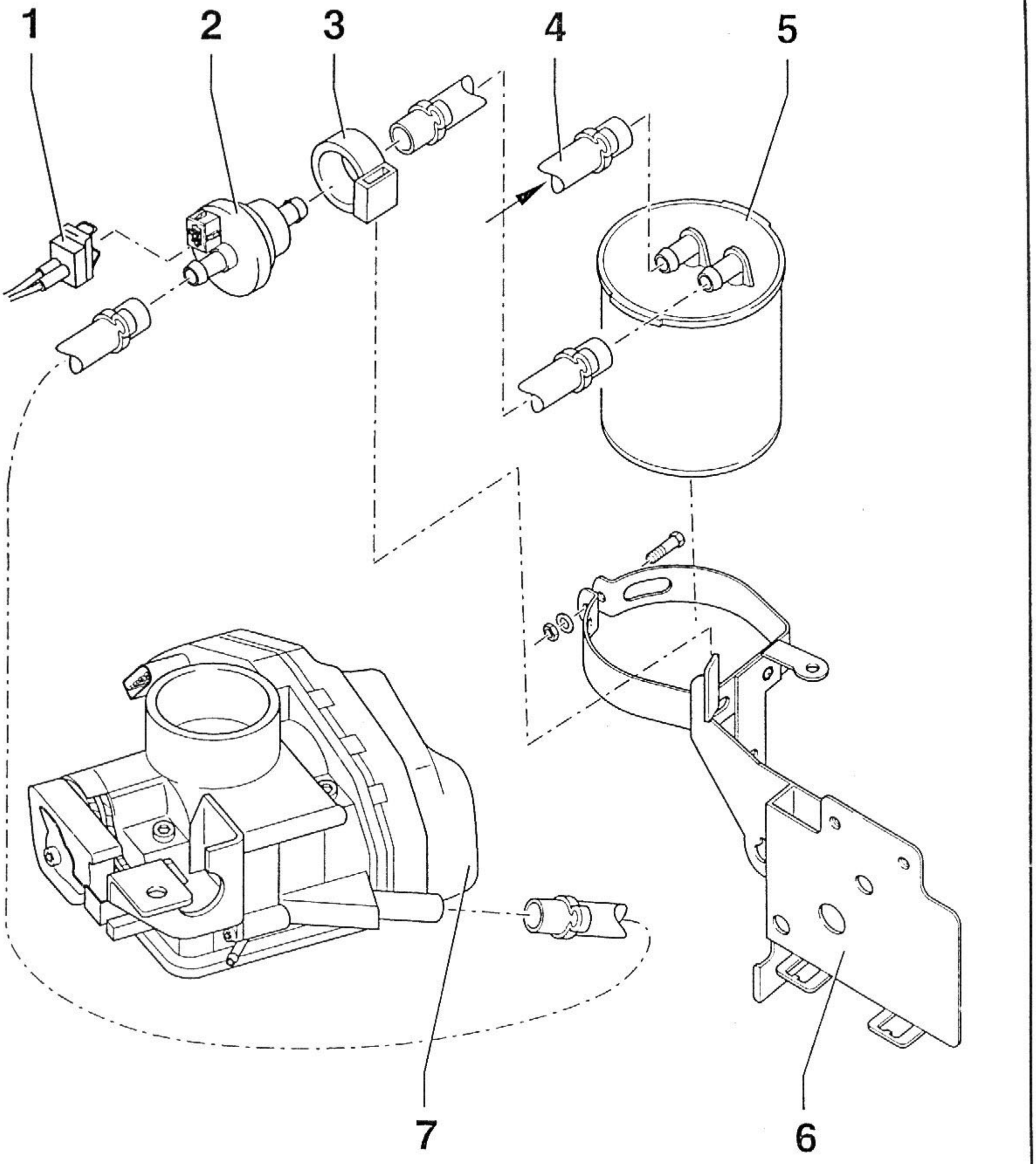
3 - Retaining ring

4 - Vent pipe
- ♦ From gravity valve to fuel tank
  ⇒ page 20-2, item 5

5 - Activated charcoal filter
- ♦ Fitting location: in left of engine compartment at suspension strut dome

6 - Bracket

7 - Injection unit



Models with Simos 2P

1 - Connector

2 - Solenoid valve 1
- Valve is actuated (pulsed) by the control unit
- Testing:
  ⇒ Repair group 01; Self-diagnosis; Final control diagnosis

3 - Retaining ring

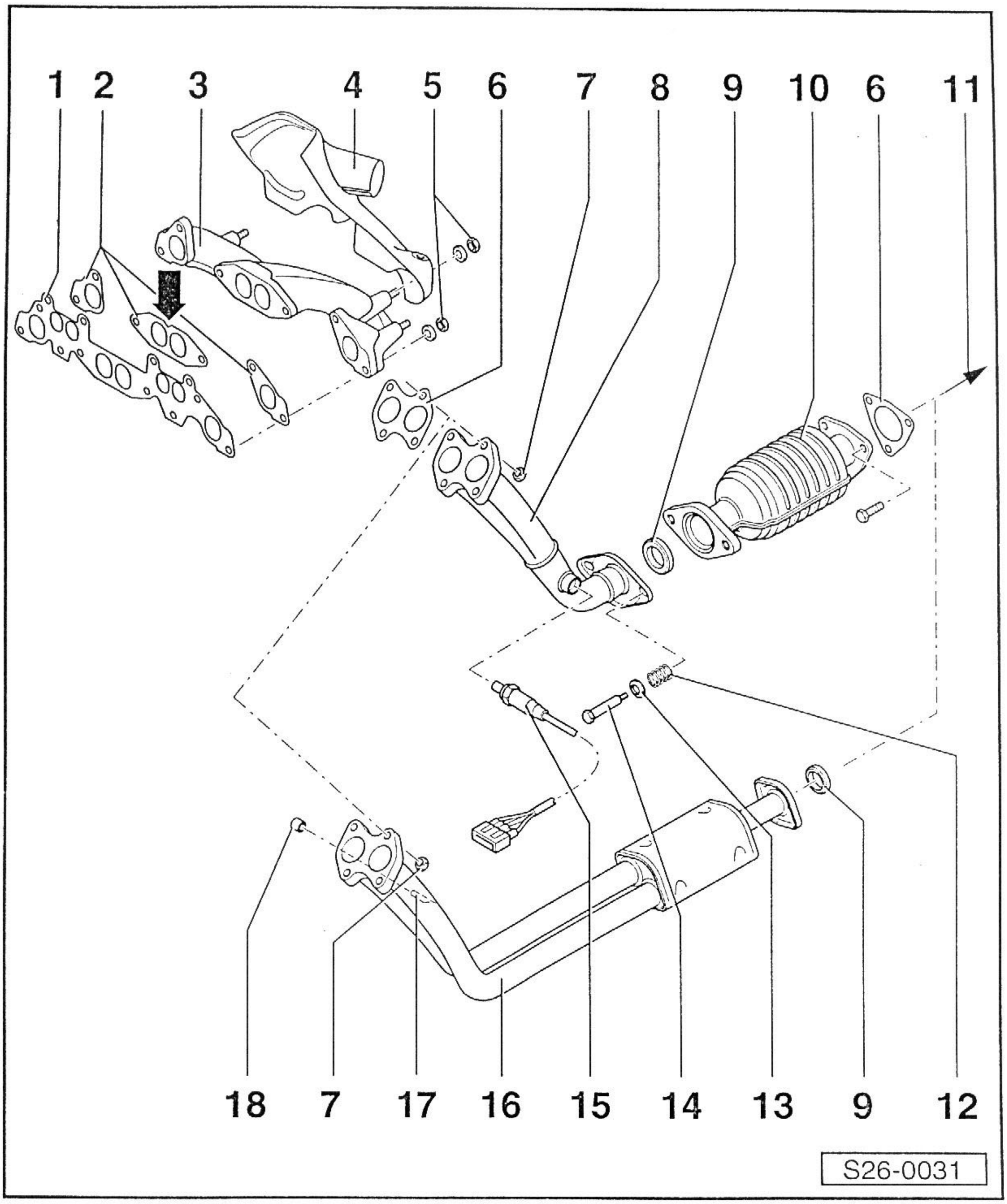
4 - Vent pipe
- from anti spill valve at fuel tank ⇒ page 20-2, item 5

5 - Activated charcoal filter
- Fitting location: in left of engine compartment at suspension strut dome

6 - Bracket

7 - Throttle valve control unit

Removing and installing parts of the exhaust system



Notes:

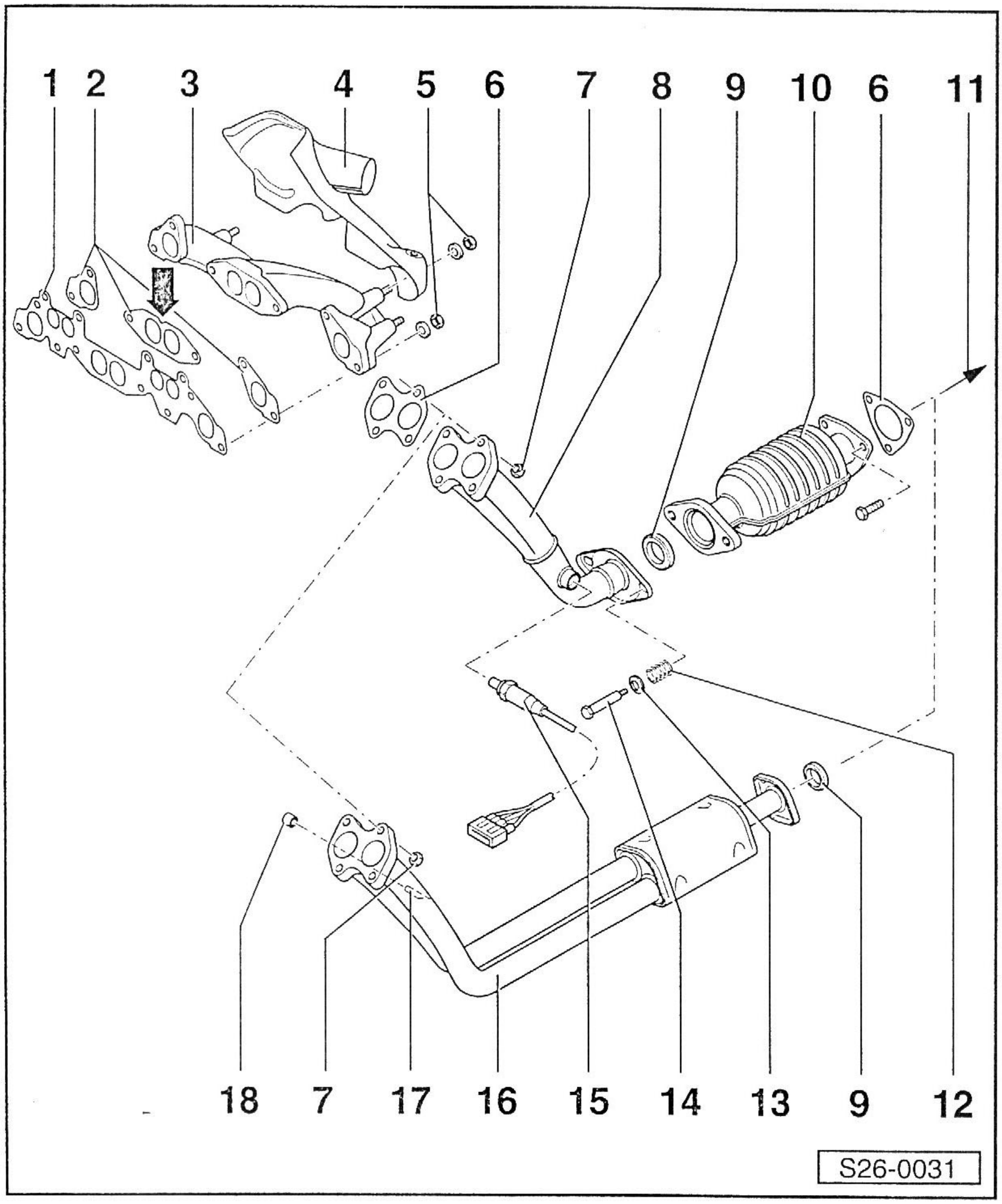
- *After carrying out removal and installation work on the exhaust system, ensure that the exhaust system is not twisted and that there is adequate clearance to the body, Fig. 2, page 26-5. If necessary, slacken clips and align silencer so that adequate clearance to the body exists at all points and that the load is evenly distributed over the hangers.*
- *Always replace self-locking nuts.*

Exhaust manifold, front exhaust pipe and catalytic converter with attached parts

1 - Gasket
- Version for engine 135, 135B, 136B
- Replace

2 - Gasket
- Version for engine 135M, 136M
- Replace
- Slot on middle part of gasket faces towards cylinder head cover

3 - Exhaust manifold



4 - Warm air baffle

5 - 25 Nm

6 - Gasket
- ♦ replace

7 - 22 Nm

8 - Front exhaust pipe
- ♦ on models with fuel injection system

9 - Seal
- ♦ flat side faces towards front exhaust pipe

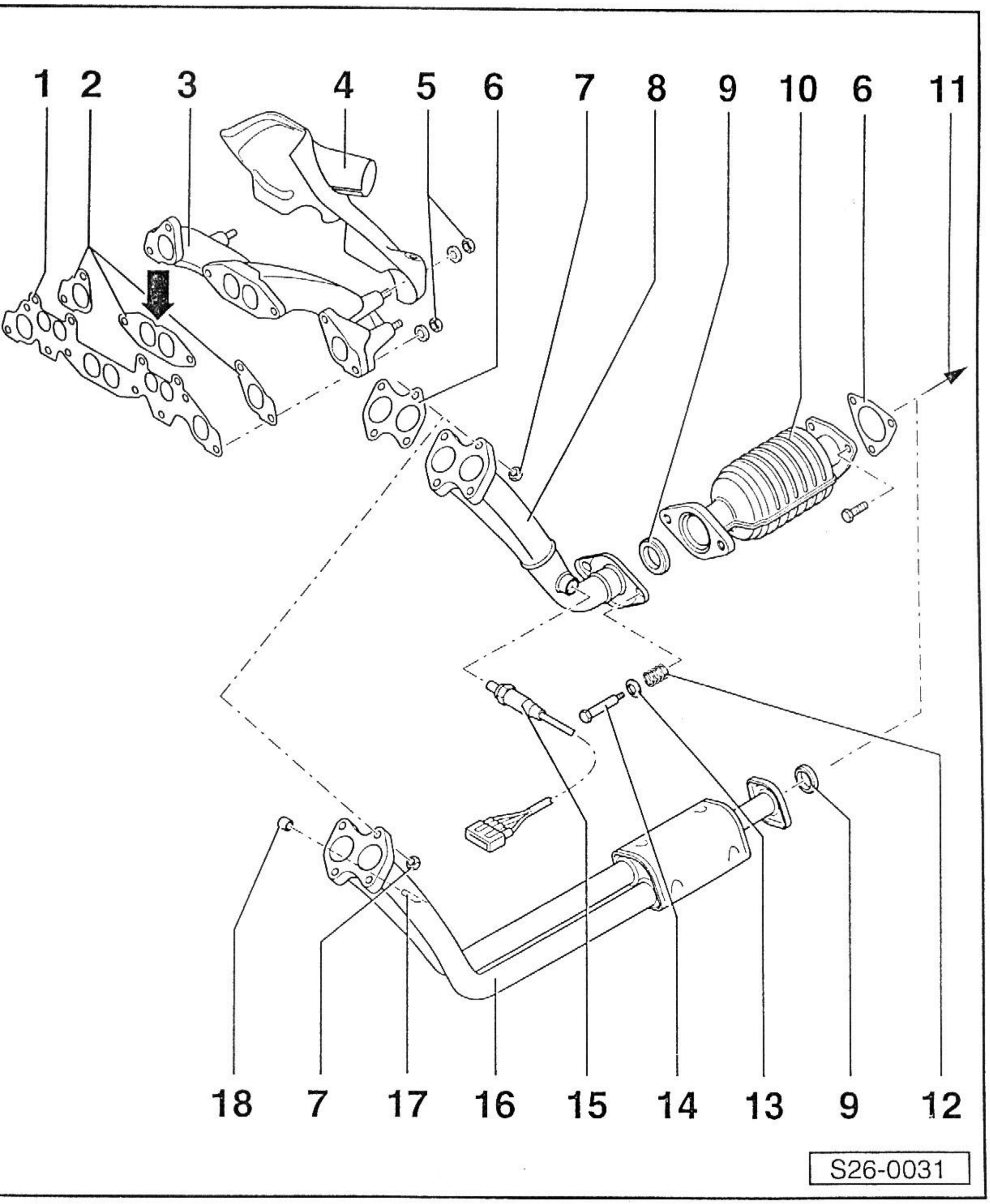
10 - Catalytic converter
- ♦ on models with fuel injection system

11 - to front silencer
- ♦ ⇒ page 26-4, item 1

12 - Spring

13 - Spring retainer

14 - 14 Nm



15 - Lambda probe

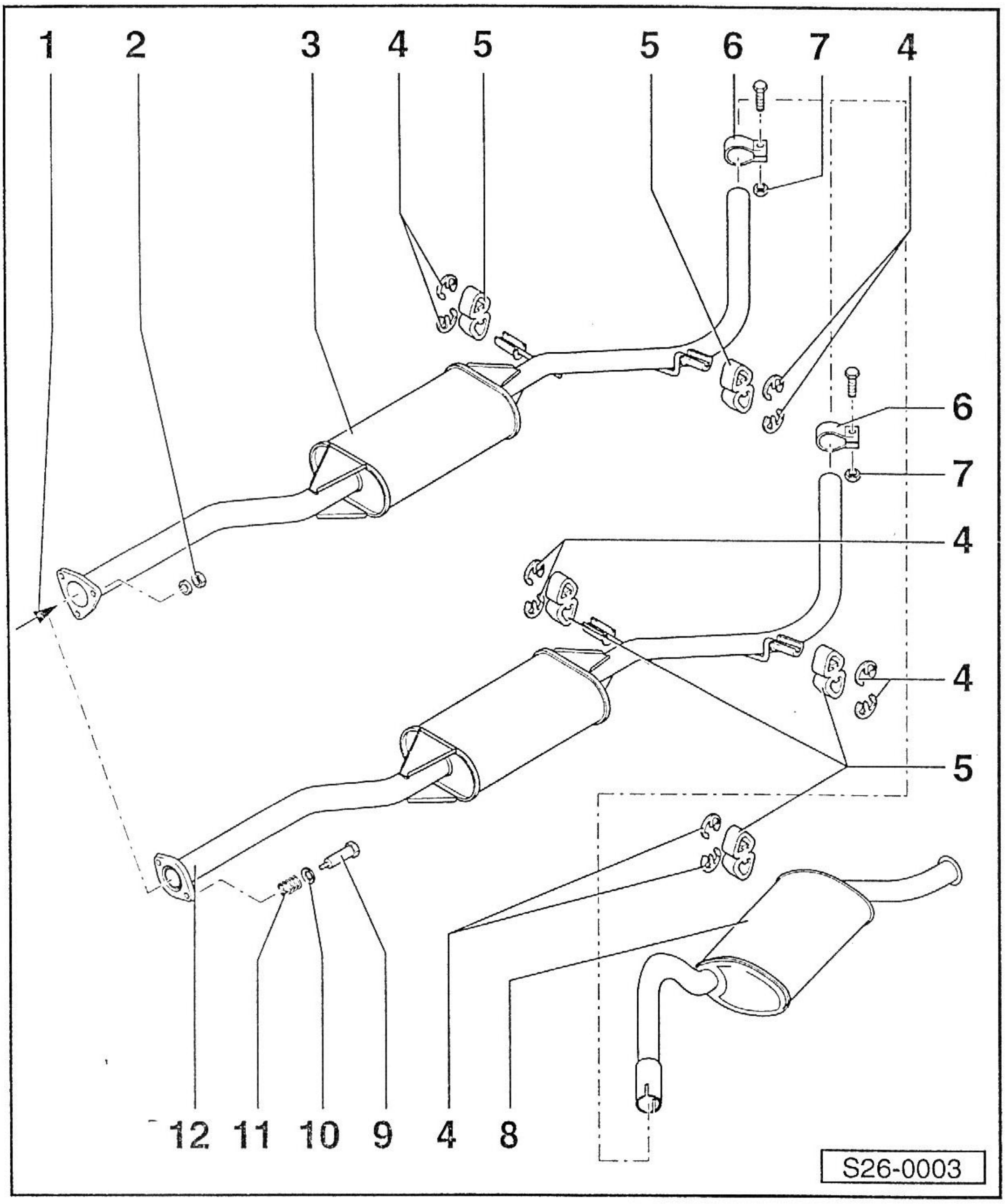
- 50 Nm
- Grease only thread with „G5"; „G5" must not get into the slot of the probe body
- Testing:
  ⇒ Mono-Motronic fuel injection and ignition system; repair group 24
  ⇒ Simos 2P fuel injection and ignition system; repair group 24

16 - Front exhaust pipe

- on models with carburettor engine
- without catalytic converter for certain countries

17 - CO sampling pipe

18 - Cap



Silencer with hangers

1 - From catalytic converter or front exhaust pipe

2 - Hexagon nut
♦ 15 Nm

3 - Front silencer
♦ On models with Mono-Motronic

4 - Lock washer

5 - Retaining ring

6 - Clamp-type clip

7 - 20 Nm

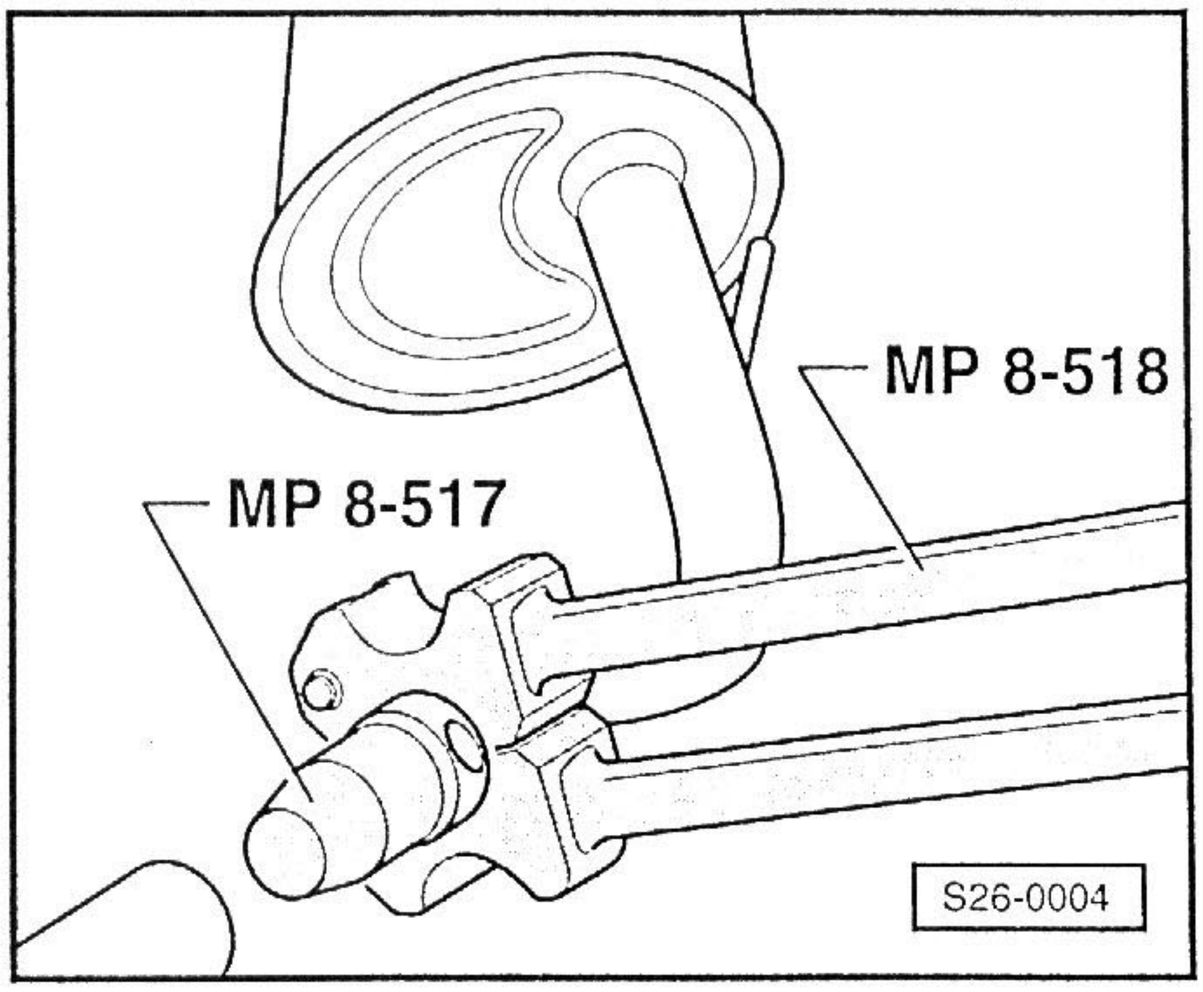
8 - Rear silencer

9 - Hexagon bolt
♦ 13 Nm

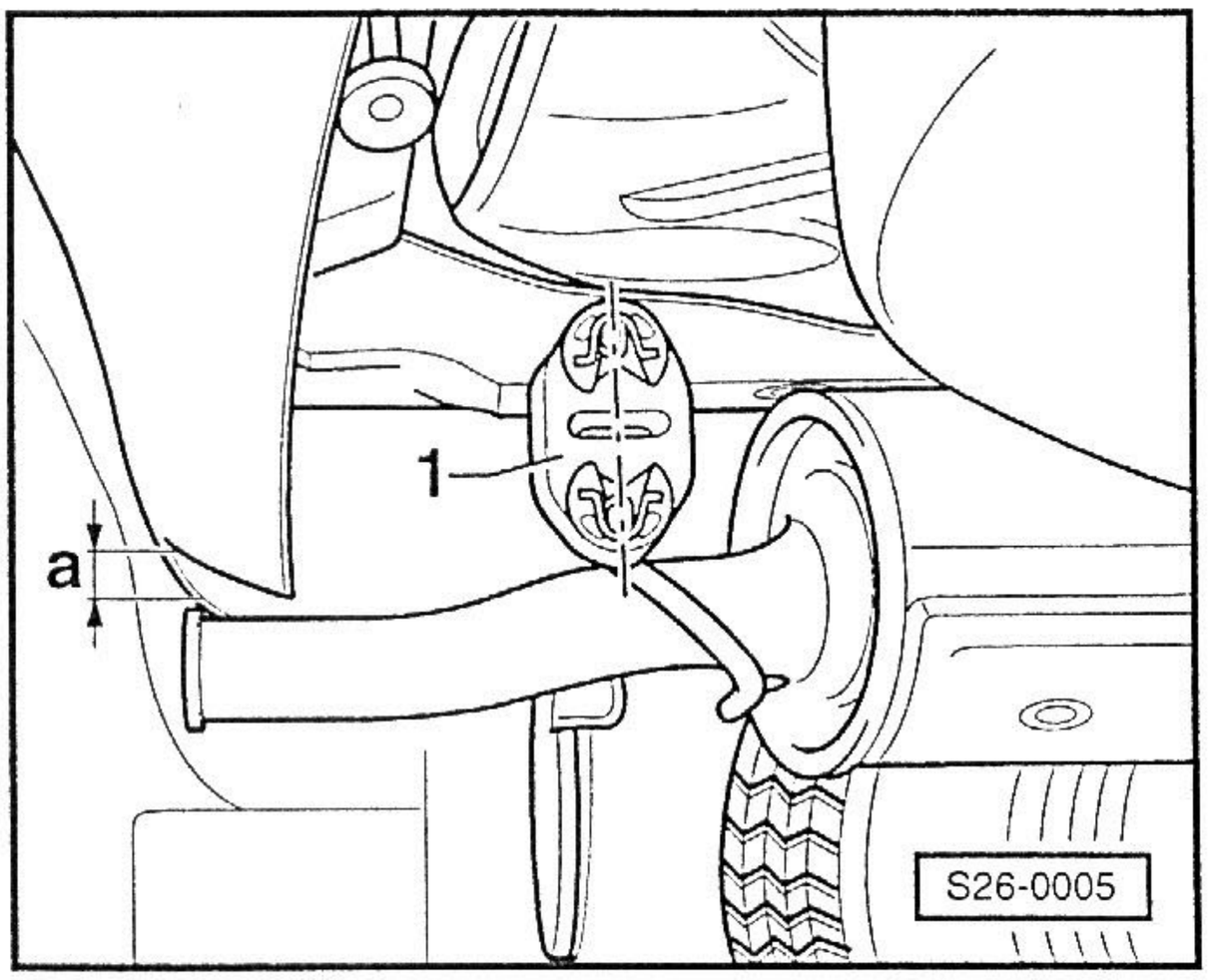
10 - Spring retainer

11 - Spring

12 - Front silencer
♦ On models with carburetor engine



◀ Fig. 1 Aligning pipe diameter with calibration drift MP 8-517 and calibration pliers MP 8-518



◀ **Fig. 2 Fitting location of silencers**

Size -a- = about 25 mm

The brackets of the retaining rings -1- must be positioned vertically above each other.